

# MARINE REVIEW.

VOL. VIII.

CLEVELAND, O., AND CHICAGO, ILL., OCT. 5, 1893.

No. 14.

## The Ashtabula Steel Company.

Last week the REVIEW published an interview with an iron manufacturer of Cleveland, who advanced the opinion that the Rockefellers were interested in preparations now being made at Ashtabula Harbor for the erection of a steel plant. With a view to avoiding any statements that would mislead the people of Ashtabula in the matter of real estate values, the interview was printed simply as an opinion, but it was taken up by someone in Pittsburg and sent out by the Associated Press on Saturday last as a statement of facts, without qualification of any kind. The promoters of the land and steel companies at Ashtabula have been furnished with copies of the article in question, but they neither deny nor confirm the rumors. Few people in the iron business are willing to believe, however, that a steel works is to be built at Ashtabula on anything near the scale indicated by the company that is offering thousands of lots for sale in the proposed new manufacturing town. Still, quite a show of beginning construction of the works has been made, and the steel company, with which the name of Mr. Blair is connected, authorizes the statement that the following parts of the works have been contracted for:

One building 100x380x30 feet high, all steel; two buildings 65x340x37 feet high, all steel; four buildings 25x65x17 feet high, all steel; six buildings 46x65x17 feet high, all steel; one building 60x420x25 feet high, all steel; two buildings 20x240x20 feet high, all steel; two buildings 30x100x20 feet high, all steel; twenty boilers of 125 horse power each, making 2,500 horse power in all; two blooming mill engines, 36-inch cylinder by 60-inch stroke, to develop 1,100 horse power each at  $\frac{1}{4}$  cut-off, 1,414 horse power at  $\frac{1}{3}$  cut-off, and 1,800 horse power at  $\frac{1}{2}$  cut-off, with 80 pounds initial steam pressure; two electric traveling cranes of 4,000 tons capacity each, with three Thompson-Houston motors, and two similar cranes of ten tons capacity each, together with the electric power plant for generating the power for the various motors and the lights for the works. Among the firms said to have been awarded contracts are: Keeling, Ridge & Co. of Pittsburg, excavations for buildings, construction of side tracks, etc.; Shiffler Bridge Company of Pittsburg, iron buildings; A. B. Farquar & Co., engines and boilers, and the Industrial Iron Works of Bay City, electric traveling cranes.

## Bridge Propositions at Duluth and Superior.

Since the meeting of the finance committee of the Lake Carriers' Association in Cleveland last week, a letter relative to the bridge propositions now being agitated at Duluth and Superior has been forwarded to the secretary of war. The communication which is separate from the petition that has been generally signed, is an expression of the position taken by the lake carriers in the matter, and is in substance as follows:

"We recognize the desirability, if not necessity, of bridge connection between Connor's point and Rice's point, yet the importance of the channel there is so great that all precautions should be taken to create no undue or unnecessary obstruction in the channel. We therefore respectfully suggest and urge that a board or commission of engineers be appointed to investigate the different plans proposed and to report whether a single bridge can not be built, so constructed as to adequately accommodate all land travel—that is to say steam and street railway, as well as teams and foot passengers. And we respectfully urge that no bridge be permitted which does not in the minds of dis-

interested experts furnish the greatest accommodation to land traffic with the least obstruction and delay to free navigation of the natural water highway. It appears entirely feasible to provide all necessary accommodations by one bridge. The natural conditions are such that more than one bridge will create great and unavoidable obstruction and lead to serious delays and dangers in navigating the place. It is also perfectly manifest that no single bridge can take care of the land traffic unless it can accommodate steam and street railway traffic and also teams and foot passengers."

## Range Lights at Lorain and Fairport.

Range lights will be established at Lorain and Fairport harbors about the 15th inst. In both places there will be three fixed lights, two red and one white, arranged vertically 4 feet apart, with the white light in the middle, and shown from lens lanterns suspended from a triangular, pyramidal, skeleton iron tower. At Fairport the lights will be located near the shore end of the east pier and in connection with the light on the outer end of the east pier will form a range on the center line of the pier, marking the east side of the channel to the harbor. At Lorain, or Black river, the lights are near the shore end of the west pier and mark the west side of the channel to the harbor.

Commander Brice of Chicago announces that light vessel No. 60 will be moored in the northern end of Green bay S. 18 degrees W.,  $1\frac{1}{2}$  miles from Eleven-Foot shoal, and S. 68 degrees W.,  $1\frac{1}{2}$  miles from Corona shoal in about 60 feet of water.

## Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on Sept. 30, 1893:

	Wheat, bu.	Corn, bu.
Chicago.....	19,267,000	3,901,000
Duluth.....	3,490,000	.....
Milwaukee.....	945,000	.....
Detroit.....	1,035,000	17,000
Toledo.....	1,755,000	265,000
Buffalo.....	1,509,000	389,000
Total.....	28,001,000	4,572,000

At the points named there is a net increase for the week of 342,000 bushels of wheat and 1,159,000 bushels of corn.

## Bills Introduced in Congress.

The following bills of interest to vessel owners have been introduced in congress recently.

By Mr. Dalzell—A bill (H. R. 1922) providing for a survey of a route for a ship canal to connect the waters of Lake Erie and the Ohio river.

By Mr. Somers—A bill (H. R. 3508) authorizing the establishment of a pier-head light at or near South Milwaukee, in the state of Wisconsin—to the committee on interstate and foreign commerce.

By Mr. Mallory—A bill (H. R. 4111) to require steam vessels of the United States of 1,000 tons or more, to have one engineer and helper on watch in their engine rooms while under way, and to require all steam vessels of the United States continuously under steam for more than ten hours to carry two licensed engineers—to the committee on commerce.



### Tips from the Man on the Dock.

I want to say a word about the effect of stranding on the steel boats. My daily beat on the dock has the effect of teaching me many object lessons. Opinions are formed through observation on my rounds that ye editor of the indispensable MARINE REVIEW may not entertain, but from which I can not be easily dislodged. From viewing the bottom of the magnificent steel steamer Merida, and my knowledge of the effect of stranding on the bottom of the steamer Brazil and very many others, I am convinced that a steel boat must not be allowed to touch bottom. An accident by stranding that would not even start a wooden boat to leaking will knock out from \$10,000 to \$20,000 on a steel boat. The spring and elasticity of a wooden boat will often hold her harmless when floundering over boulders or when grounding, requiring the use of powerful tugs to pull her off. Steel boats have no such elasticity, and, like an egg shell, "something must git" when they go on.

\* \* \* \*

The principal reason for the frequent stranding of steel boats in my opinion, is fast running over shoals and through dangerous channels in our rivers, also loading to a draught about equal to the depth of water to be navigated. A mercenary or ambitious owner, or master, is generally behind the affair. Ambition as to bringing down the biggest load in the quickest time, to make or break a record, often results in the species of accident I am considering. Steel boats have less displacement and can carry a larger load on the same draught than a similar sized wooden boat, and should load to keep at least 6 inches between them and the bottom of the channels. It is also well known that in shoal places, a boat running full speed will settle or "suck the bottom," when a boat running under check would pass over. So there remains no question but that fast running and over-deep loading are the real causes of many of the serious accidents that are happening through stranding.

\* \* \* \*

I would also observe that insurance companies pay a premium on such recklessness, and involuntarily stand in with the mercenary or ambitious vessel owner. By waiving the clause of "one-third old off for new" on many of the steel boats, and allowing the stranded craft full compensation for damage to her bottom, the generous insurance companies put the vessel owner in shape to run more risk to accomplish his ambitious purposes. Heavy installments of damages against the insurers of course result, but the annual rate for insurance on all vessels the following season, has only to be increased to make them good. It is a little hard on the wooden boats to bear the brunt of that gap, but they will have to stand it, I suppose, or more and more become their own insurers.

\* \* \* \*

I am told that in busy times during the past two or three years, when the delay of going into dry dock would be very expensive, some odd methods have been resorted to in stopping small leaks in these big steel boats. Some time ago the Spokane "touched lightly" in the rivers, and developed a leak on arriving down that promised considerable annoyance if an attempt was made to have her go out on another trip without being docked. She was examined by John Smith, superintendent of the Globe Iron Works Company's ship yard, and he decided to plug up the crack. He prepared a cushion, similar in shape to the ordinary cushion used on a buggy or carriage seat, but made of strong canvas and stuffed with a soft mixture of cotton batten and other substances. This cushion was placed over the crack and then shored to the upper part of the water bottom. The Spokane finished the season with this plaster in her water bottom, and later a fracture of the same kind in the Mutual line steamer Corona was treated in the same way, permitting her to make two trips without going into dock, after striking on Ballard's reef, Detroit river.

One of the REVIEW's friends in Detroit adds this note to a business communication: "You are about to receive in Cleveland a Detroit gentleman, Mr. I. G. Sowter, who was for a long time superintendent of the Dry Dock Engine Works here, and who takes a similar position with the Cleveland Ship Building Company. In this case it is more than usually so, that Detroit's loss is Cleveland's gain. I trust you will lose no time in making his acquaintance in his new position and I assure you that you will find in him not only a man well posted in his business, but a pleasant, kindly, sociable gentleman."

### Iron Mining Matters.

Shipments of iron ore from Two Harbors up to and including Wednesday, Sept. 27th, aggregated 743,031 gross tons and were divided as follows: Chandler, 360,964 tons; Minnesota, 310,553; Zenith, 11,112; Cincinnati, 9,939; Canton, 24,411; Franklin, 23,876; Hale, 2,176. Shipments of Gogebic range mines through Ashland up to and including Saturday, Sept. 23, foot up 948,508 tons, divided among the different mines as follows: Ashland, 27,760 tons; Aurora, 138,213; Colby No. 2, 38,889; Tilden, 105,458; Germania, 4,975; Iron Belt, 17,625; Montreal, south vein, 1,347; Montreal, north vein, 27,235; Eureka, A, 1,949; Brotherton, 14,643; Comet, 5,035; Eureka, 24,167; Careys, 44,214; Newport, 93,679; Norrie, 213,008; East Norrie, 68,067; Pabst, 89,906; Jack Pot, 1,651; Davis, 11,353; Sunday Lake, 19,344.

Some of the Missabe companies that took leases during the boom period and have since found that their selections were not among the valuable mineral lands on the range, are throwing up their leases. The Charleston Iron Company, after expending about \$12,000 in explorations, has abandoned tracts of land upon which the minimum output was to be 25,000 tons a year and the royalty 25 cents a ton.

Capt. John Val Lance, who was formerly engaged in iron mining on the Gogebic range, but who is now in the employ of the Spanish-American company in Cuba, was at Ironwood, Mich., a few days ago. He is of the opinion that if the tariff of 75 cents a ton on ore should be removed, the Cuban companies could undersell Lake Superior producers in Pittsburg.

### Expensive Repairs.

Although the survey has not yet been finished on the steel steamer Merida, it is probable that repairs to her bottom, which was crushed by stranding, will prove more costly than any similar work as yet required on the lakes. Similar fractures have been sustained by several other steel boats in the past by coming in contact with rocks, but in the case of the Merida the break extends over a greater number of plates and frames in her bottom. It is unfortunate, also, that the long line of plates injured by the vessel scraping over the obstruction after striking are inside plates that are difficult of removal. During several days past, a force of about 125 men have been engaged in removing the damaged material and preparing for the new plates and splices in the frames, and the boat will probably be in dock twenty days or more in all.

### Pig Iron Production.

In twenty-seven years ending with Dec. 31, 1893, the total output of pig iron in this country was 105,712,591 gross tons, of which 65,571,334 tons were produced in the last decade. It was in 1864, that the United States first made 1,000,000 gross tons of pig iron, falling below that figure in 1865, but exceeding it in 1866. In 1872 more than double the amount of pig iron was produced than was made in 1866; in fourteen years (1880), the output was over treble that of 1866; in sixteen years (1882), it was almost four times the output of 1866; in twenty-one years (1887), it was over five times the output of 1866; in 1889, twenty-three years after, it was over six times the output of 1866; in 1890, it was seven and five-eighths times the production of 1866. Production was somewhat lower in 1891 and 1892 than in 1890. In 1892 the production aggregated 9,157,000 gross tons, made in about 300 furnaces.—John Birkinbine in Cassier's Magazine.

The Frontier Iron Works of Detroit will furnish the engines, boilers and machinery for light-vessel No. 58, building by the Craig Ship Building Company of Toledo. The propelling machinery will consist of a single cylinder, surface condensing engine 18 by 20 inches with Dean independent air and circulating pumps, and two tubular boilers 6 by 10 feet. The Craig Ship Building Company states that the Detroit company, although given the contract, was not by any means the lowest bidder.

ONE FARE, OCT. 12TH—To Chicago and return via popular Nickel Plate road. Superb new dining cars.

FIFTEEN PHOTOTYPES OF THE LATEST LAKE STEAMERS AND A PICTURE OF THE GREAT EASTERN, NEATLY BOUND, FOR 50 CENTS. WRITE THE MARINE REVIEW, NO. 516 PERRY-PAYNE BUILDING, CLEVELAND, O.



### Iron Ore and Lake Freight Matters.

Although grain freights have been improving until 3 cents is the rate from Duluth to Buffalo, giving assurance of \$1 on ore from the head of Lake Superior, there is nothing in the condition of the iron market to warrant high lake freights, and it is, of course, generally agreed that without a very liberal movement of iron ore there can be no great advance in transportation rates. One purchase of 60,000 tons of non-Bessemer ore was made by a southern Ohio furnace company during the week at about summer prices, but it was divided among three or four sales agents and was in no way indicative of a general buying movement. In fact ore men are beginning to fear that unless furnaces begin to start up more rapidly, a very large surplus, instead of a decrease, in ore supplies will be found on the docks again next spring, mainly on account of the liberal shipments brought about by the low lake freight rates of the past four months. This condition and the prospects of a big Missabe output next year are discouraging features in the outlook for many of the mines on the older ranges. At the Girard furnace of Girard, O., for about a week past, Biwabik ore has been used exclusively and the furnace has worked better than ever before. Reports of this kind will go a great way towards making sales of Missabe ores to manufacturers who might be doubtful about the extent to which it could be used in their furnaces.

### Views of Edwin S. Cramp on Steel Castings.

In line with the experience which the Globe Iron Works Company, Cleveland, has had during the past week with some very large steel castings, the views of Mr. Edwin S. Cramp, superintending engineer of the William Cramp & Sons Ship and Engine Building Company, on the subject of steel castings generally, may prove interesting. In a paper prepared for the recent engineering congress at Chicago, and which will be published in the bound volume of proceedings of the marine and naval branch of the congress, Mr. Cramp refers in a general way to the experience of foreign navies with steel castings since pistons were cast for one of the ships of the British navy in 1880. He then reviews at some length the progress made by steel founders in this country since the use of these castings on a large scale for marine work, both in engineering and construction, was begun with the adoption, by Secretary Whitney, of the plans on which the earlier ships of his administration were built, beginning in 1886. Coming down to a later date he says that the experience since 1890 has been that with large castings like bed plates, stern posts, stems, hydraulic cylinders, shaft struts, hawse pipes, etc., the percentage of success has ranged from 65 in the more difficult forms to 90 in the simpler ones, while the tensile strength has been from 62,000 to 78,000 pounds and elongation from 15 per cent. to 25 per cent. Mr. Cramp's conclusions are not altogether encouraging to the promoters of the industry. He says:

"I think it proper to say, having had experience in both directions, that recent development of the steel industry in the United States as compared with its state abroad presents a much more gratifying progress in forgings and rolled material than in castings. Our great forges, such as Bethlehem, thanks to the genius, energy, and diligence of the venerable John Fritz and his co-laborers, are now quite abreast of any in the world, if not actually in the lead. Our principal rolling-mills, in operation at many points, from the Chesapeake bay to the head of Lake Superior, with another, among the most important, about to start up at Puget Sound, have no odds to ask of any foreign mills in any description of plates, shapes or structural material. But it must be confessed that our steel founders have not yet reached an equal grade of excellence as compared with those of Great Britain, France, or Germany. It may be that, with the great and sudden expansion of the volume of business, together with the high prices that have ruled, many new enterprises have

started, and there has been a disposition to perfect the new organizations at the expense of the older ones, by inducing away the leading men of the latter as soon as they had acquired valuable experience. This is, of course, true of all trades, and will in time correct itself; but it seems to have affected the cast-steel industry with peculiar force in the last few years—at all events, to a much greater extent than is true of the other branches of the steel industry. Then again, the growth of competition has led some foundries to attempt cheapening of their cost of production, which could be done only by use of inferior raw material or employment of less skilled assistance. This is the policy that never fails to be fatal to any establishment which may adopt it. However, when it is borne in mind that none of these great industries now domesticated in our midst date back as much as a decade, we may be fairly content with the results achieved, and confidently trust to the natural development."

### Defective Steel Castings.

The Globe Iron Works Company, Cleveland, has just had an experience with steel castings that will result in a delay of more than a month in the launching of the first of the passenger steamers building for the Northern Steamship Company. In these big twin-screw ships the stern brackets are immense solid pieces of steel, weighing five tons each. Four of them were ordered from a steel foundry in Pennsylvania, and all were made from one pattern, the ships being duplicates. After one of these massive stern pieces had been put in place on the boat that is now well advanced, and most of the plating and other work completed around it, it was found that the casting had cracked in various parts, and was altogether so defective that it could not be used. The other castings, made from the same pattern, are also similarly defective and can not be used, so that all will have to be shipped back to the foundry. The fault is claimed to be in right-angled ribs within the main parts of the casting, which were intended for strength, but which seem to have had the opposite effect. Inasmuch as the line of weakness extends along the junction of these ribs, they are said to have prevented equal expansion and contraction in cooling. As it is claimed that these ribs in the casting are not in accordance with the design, it is expected that the loss will fall upon the manufacturers, but the ship builders, or owners of the boats, are also at a loss of time, as well as the labor involved in the work done on the stern of one of the boats. How one of the brackets happened to be put up without being subjected to severe tests is not explained. In some places castings of this kind are raised as high as 25 feet in the air several times and dropped to the ground, after having been hammered in all parts, with a view to developing any flaws that might exist in them.

### Beat the Eddy.

In a letter to J. W. Westcott of Detroit under date of Oct. 4, Capt. C. W. Brown of the steamer Centurion says: "I have always understood that Detroit newspapers favor Detroit boats, and in order to avoid mistakes I wish to say that the Selwyn Eddy and the Centurion left the Sault yesterday morning, the 3rd, with the Centurion in the lead until Detour was reached. There the Centurion was obliged to stop to take on fuel. She lost just forty minutes and then took after the Eddy and passed her at Point aux Barques, and went into Saint Clair river thirty minutes ahead, making the "beat" one hour and ten minutes. In order to give the Centurion a fair show with one of Detroit's so called fast boats, I did not put on the required amount of fuel at Detour and was obliged to take on more at Marine City where the Eddy passed us again."

THE WONDERS OF THE WORLD'S FAIR—Should be seen by every citizen of this glorious country of ours. The Nickel Plate road's one fare excursion Oct. 12th will be your opportunity. Don't miss it.



## Steamboat Inspection Service of the United States.

[By John M. Sweeney of Harvey, Ill.]

In the published reports of the proceedings of the thirty-sixth annual meeting of the board of supervising inspectors of steam vessels, held at Washington, D. C., in January 1883, the following is contained on page 61 among the list of casualties reported from the New York district:

"Oct. 3rd—Charles Wagoner, wiper, ferryboat Wyoming Oct. 1st, 1887, was caught between crank and cross girt of frame of ferryboat, breaking seven of his ribs and cutting his liver into seventeen pieces, from which injuries he died."

To the student desirous of discovering whether the laws formulated by Congress and construed by the board of supervising inspectors are beneficial to the interests of navigation, the report of this casualty suggests an inquiry as to whether there is not much harm resulting from the technical attempts of local inspectors to carry out the rules of the board of supervising inspectors, as the local inspectors understand these requirements from their superiors. The law establishing certain rules and regulations for the government of steam vessels and authorizing the board of supervising inspectors to make rules and regulations in detail has now been in operation for about forty years. The object of this paper, is to consider particularly the merit of such legislation, and the results from the attempts of the board of supervising inspectors to carry out the laws in dealing with the marine service on the western waters flowing into the Gulf of Mexico. In 1852 the tonnage of steam vessels inspected in the United States was 417,225 tons; in 1892 it was 1,523,303 tons. The number of steam vessels in the United States in 1852 was 1,390, and in 1892, 7,527. Prior to 1852 great improvements had been made without the assistance of any law regarding the design or construction of boats, or the safety of navigation on western waters. Since 1852 the change has not been so rapid so far as the general outward appearance of the boat is concerned, but has been much greater in the detail of construction of hull and machinery.

There is printed herewith an engraving from an old wood-cut print of the steamer "Tecumseh," which is supposed to have navigated the Ohio and Mississippi rivers in 1826, and also a picture of the Fleetwood, a boat now running between Cincinnati and Louisville. As between these two pictures there is quite a contrast but the Union line steamers running between Wheeling, W. Va., and Louisville, Ky., in 1852 were similar in outward design to the present Fleetwood. While this is true of the general outward design, it is not true of the details of machinery construction, where great improvement has been made; and while none of these improvements represent a radical departure, they have together tended to better service, until today the records show that cases of explosion or accident of any kind have very much diminished in proportion to the number of steam vessels navigating western waters.

The board of supervising inspectors seem inclined to take to themselves or to the law under which they operate, all of the credit for the better navigation here referred to, and their claim seems to be accepted in some quarters without question. In the published proceedings of the board meeting of 1892, a select committee reporting on Senate bill No. 1755 (the famous Frye measure) referred in their report to this matter and quoted the remarks of Hon. Omar D. Conger in Congress as follows: "Before 1873 there had been casualties, ship-wrecks, boiler explosions and loss of life, until everyone who took up a daily paper expected to see under the head of accidents an account of some explosion resulting in the loss of many lives, it was then so common a thing. But since this law (the act creating the board) went into operation, year by year, the number of casualties of all kinds have decreased. The public have come to feel that there is more security in steamboat traveling."

It has not occurred to the board that there could be other reasons than the enforcement of the rules of the inspection service for the great benefits thus claimed to have been attained. There is in the rules of the board and in the laws of Congress much that is good and much that is bad, but it is a fact beyond dispute that there is not a good rule covered by either of these two law making powers, that has first not been discovered and adopted by the designer, owner or navigator of the craft to which it refers. So long as the board confines itself to enforcing the use of improvements which are first discovered and adopted by the boat men themselves, beneficial results will be secured, but when the board attempts to originate details in methods of construction that have not been tried, the results are other than desirable. It is to a few of the mistakes of the board that I wish to direct particular attention—mistakes that have come directly under the observation of the writer and with full opportunity to note the results.

In 1865 this board recommended to Congress an amendment to the revised statutes, Sec. 4435, which was made a law by reason of said recommendation, and which is as follows: "When boilers are so arranged on a vessel that there is employed a water connecting pipe through which the water may pass from one boiler to another, there shall also be provided a similar steam con-

nection, having an area of opening into each boiler of at least 1 square inch, for every 2 square feet of effective heating surface contained in any one of the boilers so connected, half the flue and all other fire surfaces being computed as effective." The effect of this law was to increase some 400 per cent. the area of the connecting nozzles between boiler and steam drum where the boilers were set in batteries, requiring a larger hole to be cut in the shell of the boiler and in the steam drum, thus weakening the structural formation of both bodies and making it more difficult to secure good work on the flanges, for the reason that in the construction of western river boats it is frequently desired that the height between the main and boiler decks should be made as low as possible. There was, accordingly, a reluctance in increasing the diameter of the steam drum in proportion to the additional diameter required for the construction of the nozzles, and reluctance also on the part of steam engineers to increase the condensing surface by enlarging the steam drum. That this legislation was a grievous mistake has been admitted time and again by the inspectors, and it is fair to say that recent boards have endeavored, but without success, to have Congress undo this error of their predecessors. The practical working of this law was to require in some cases a nozzle of 14 inches diameter connecting the boiler and steam drum, and where three boilers were set in batteries three sets of such nozzles connected the boilers to the steam drum. A steam pipe 5 inches in diameter would be ample to supply the engines from this battery, and the absurdity of the large connecting nozzle became at once evident. No sooner had this rule gone into effect than another was made by the board, and construed by the local inspectors at the time to mean, that a strip or bar should be placed across the opening so cut for the nozzle in the shell of the boiler, in order to prevent the copper float used on the water gauge (in case it should become detached from its stem) from ascending into the steam drum and perhaps attempting to get into the steam pipe leading from the steam drum to the engines, thus stopping the natural outlet for the steam from the boiler.

With this legislation there was also passed by Congress, on recommendation of the board, a law requiring that for boats navigating the waters flowing into the Gulf of Mexico there should be a clearance between the flues of the boiler and the shell of the boiler, and between the flues themselves, of not less than three inches. This law produced a result which was entirely unlooked for and unthought of, and so far as the writer knows is unrecognized today, in that it induced the construction of boilers wherein the flues were placed higher in the shell, the water line raised, the steam room reduced, and the area for the elimination of steam materially lessened. Prior to the passage of this law it had been an ancient custom to place in a shell 38 inches in diameter two flues each 13 inches in diameter, and in a shell 40 inches in diameter two flues each 14 inches in diameter, with a space between the flues themselves and between the flues and the shell of about 1½ inches. Clinging to these old flue diameters for a given shell diameter, the boiler makers, in order to comply with a 3-inch clearance required by the law, elevated the flues in the boiler, thus lessening the value of essential conditions required for successful action. In many cases, from attempts to comply with this law, a great deal of trouble was experienced from priming, and the operation therefore of the boiler was unsatisfactory. There is not today on the western waters a boiler which, in respect to dryness of steam, is as satisfactory as the boilers which were used and constructed before the passage of this law.

It is perhaps unfortunate that the board of supervising inspectors are required to meet annually, because they must needs make new rules at each of their meetings. It seems, however, that they did very well in the way of "non-legislation" until the meeting of 1882, when the report of the committee appointed to formulate rules for the construction of cylindrical flues was adopted by the board and approved by the secretary of the treasury. But the boiler makers having been advised that flues must be constructed under these rules, soon demonstrated the utter incapacity of the committee, as expressed in the formula which they recommended and which was adopted by the board. The formula is as follows:

$$\begin{aligned} \text{Let } D &= \text{diameter of flue, in inches.} \\ 1760 &= A, \text{ constant.} \\ T &= \text{thickness of flue, in decimals of an inch.} \\ P &= \text{pressure of steam allowable, in pounds.} \\ \frac{1760}{D} &= F, \text{ a factor.} \\ 25 &= C, \text{ a constant.} \\ \text{Formula: } \frac{F \times T}{C} &= P \end{aligned}$$

The formula was given out as original by the board but it soon developed that it was one adopted by the British Lloyds early in the 50's, and before the experiments of Fairbairn had made known the fact that the length of the flue was a factor in its resistance to collapse. It will be noticed that in this formula no value is given to the length of the flue; indeed it is not considered at all. The operation of this rule was to require riveted flues 14 inches in diameter, built in rings or sections, to equal in thickness lap-welded flues of equal diameter. After a great deal of trouble on the part of the shipping interests concerned, the secretary of the treasury was induced to suspend operation of the law until the next meeting of the board at which meeting the vessel owners

\*The writer is indebted to Capt. E. J. Howard, shipbuilder, Jeffersonville, Ind., for the picture of this boat. She was built at the Wix yard, Cincinnati, in 1826, and launched with steam up and engine in working order. She was 174 feet long, 23 feet beam and 9 feet hold, and carried 242 tons. The engine was high pressure, 18 inches diameter and 6 feet stroke, with force pump attached to T head. There were six boilers, 18 feet long and 36 inches diameter, with two return flues in each, 15 inches diameter. Her time from New Orleans to Louisville was 8 days, 4 hours. The officers were: Abe Tyson, captain; John Tyson, engineer; John Atherton, clerk; John Bose and John Ryan, pilots.



and boiler builders appeared before the board and after demonstrating to them that the length of the flues was a factor in the case, succeeded in having adopted laws recognizing this element and repealing the existing formula.

[To be Continued.]

### One of the Turret Ships in Canada.

Kingston, Ont., Oct. 5.—One of the Turret steamers, or English whale-backs, constructed by Messrs. William Doxford & Sons, Sunderland, is at

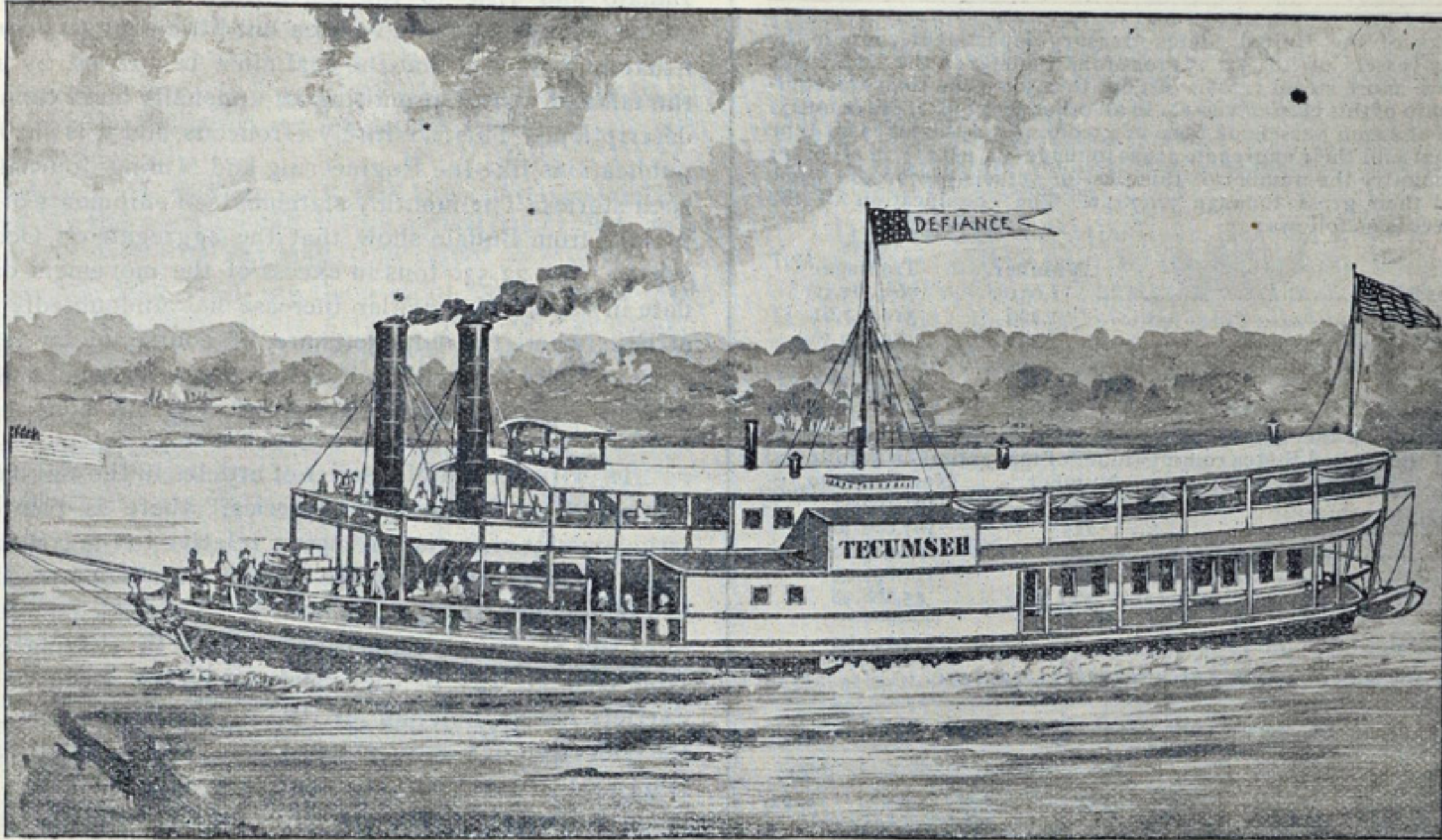
### Inventions of a Marine Nature.

Specially reported from the patent office Washington, D. C., for the MARINE REVIEW

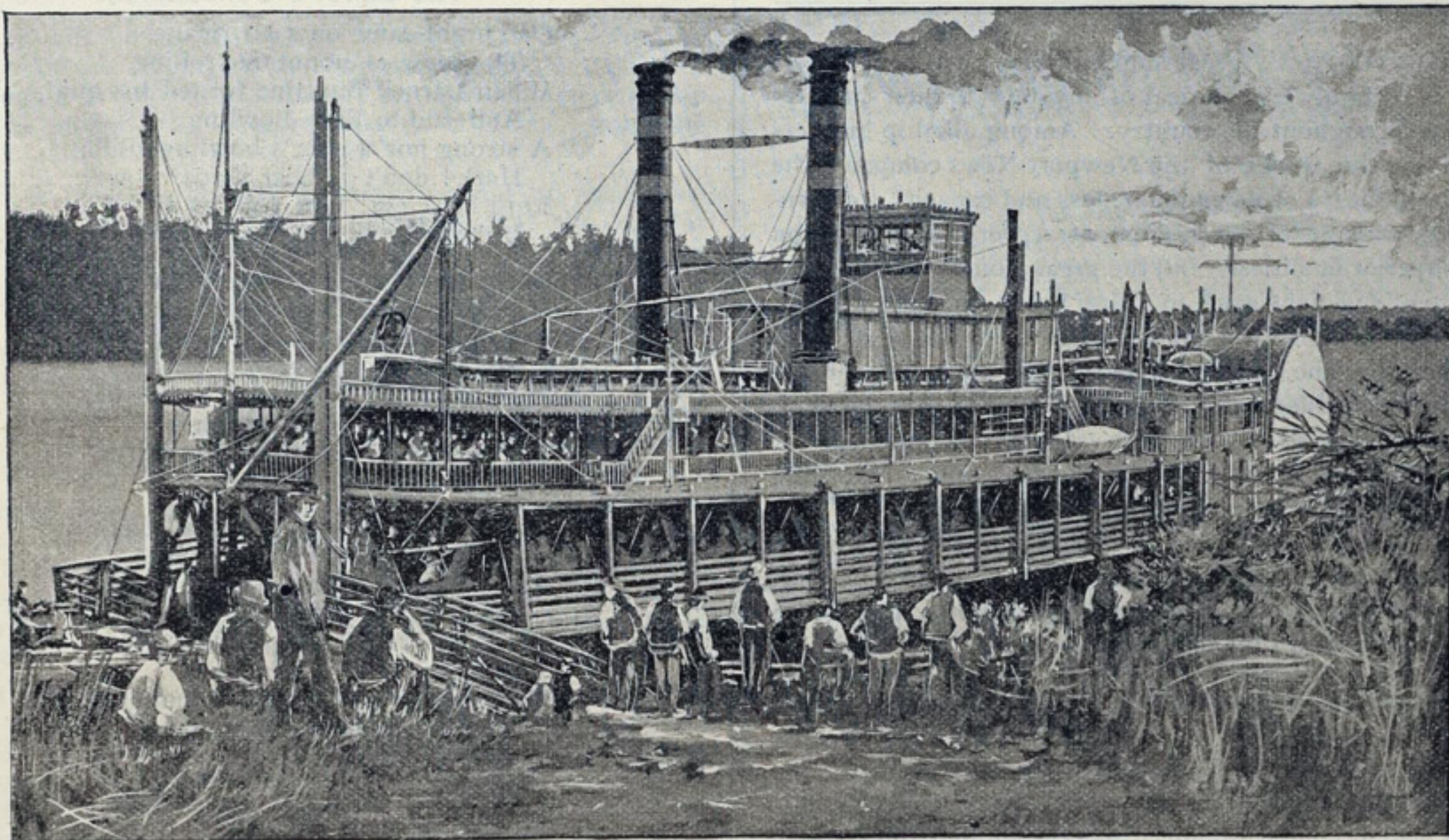
505,666—Stern bearing for screw propelling shafts, by Hector MacColl of Strandtown, Ireland; filed May 22, 1893.

506,779—Davit for putting out or taking in ship's boats, by James Sample of Wallsend, England; filed June 3, 1892.

505,782—Device for reeving halyards, by Samuel A. L. Waters of New York City; filed Dec. 21, 1892.



STEAMER TECUMSEH BUILT FOR OHIO AND MISSISSIPPI SERVICE IN 1826.



STEAMER FLEETWOOD, MODERN WESTERN RIVER BOAT.

Montreal with 3,250 tons of coal. As the vessel is only 1,766 tons net and 1,970 gross, this is quite a large cargo. She has attracted a great deal of attention.

The Richelieu and Ontario Navigation Company has cut off its service from Toronto and Hamilton to Montreal and will only run from Kingston tri-weekly. This year four of this company's steamers will lay up here, the balance at Sorel or Quebec. Recently the shipworks of this company were burned down and Quebec is seeking for their removal there even to the extent of giving a bonus of \$50,000.

505,784—Paddle wheel, by Elon G. Bailey of Redwood Falls, Minn.; filed March 27, 1893.

505,785—Propelling apparatus for vessels, by Louis Beyer of Washington, D. C.; filed April 1, 1891.

Copies of specifications accompanying these patents can be had at 15 cents each on application to THE MARINE REVIEW, 516 Perry-Payne building, Cleveland, O.

British charts of Lake Superior cover the entire north shore. \$1.



# MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O.  
Chicago office, (branch), No. 706 Phoenix building.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each.  
Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,657 vessels, of 1,183,582.55 gross tons register in the lake trade. The lakes have more steam vessels of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of steam vessels of 1,000 to 2,500 tons on the lakes on June 30, 1892, was 321 and their aggregate gross tonnage 534,490.27; in all other parts of the country the number of this class of vessels was, on the same date, 217 and their gross tonnage 321,784.6. The classification of the entire lake fleet is as follows:

Class.	Number.	Gross Tonnage.
Steam vessels .....	1,631	763,063.32
Sailing vessels.....	1,226	319,617.61
Canal boats.....	731	75,580.50
Barges.....	69	25,321.12

Total..... 3,657 1,183,582.55

Tonnage built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
1888.....	222	101,102.87
1889.....	225	107,080.30
1890.....	218	108,515.00
1891.....	204	111,856.45
1892.....	169	45,168.98

Total..... 1,038 473,723.60

## ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

	St. Mary's Falls Canal.			Suez Canal.		
	1892.	1891.	1890.	1892.	1891.	1890.
No. vessel passages	12,580	10,191	10,557	3,559	4,207	3,389
Ton'ge, net regist'd	10,647,203	8,400,685	8,454,435	7,712,028	8,698,777	6,890,014
Days of navigation..	223	225	228	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

C. P. HUNTINGTON'S great ship building plant at Newport News, Va., is certainly a good deal of mystery to men in ship-building business throughout the country. Among all ship builders who have seen the works of the Newport News company, the highest praise is heard of its completeness and capacity for turning out a big tonnage in steel ships at a very low cost, on account of superior facilities. But the great wonder is regarding the prospects of sufficient work to bring profit to such a grand enterprise. Naval work, if a sufficiency of it could be secured for a few years to come, might bring this big yard into prominence, and in this connection it may be expected that the management will make a strong effort to secure the gunboats for which contracts are to be let shortly. It was hinted regarding the last government contract awarded to the Cramps, that Mr. Huntington had a winning bid in his pocket for the work when leaving Newport News for Washington, but in a spirit of over-confidence on his way to the capitol added a round sum of extra profit to the figures and thus lost the job.

As it is announced that the light house board, after several years' experiments, has been successful in establishing electric communication with light-ships and light-houses placed at a distance of more than a mile from shore, the Lake Carriers' Association, as well as similar organizations throughout the country should do all in their power to secure the passage of bills now before Congress, which are intended to put a system of communication of this kind into practice. The great saving of life and property that would result, even on the lake coast line, from communication with light-houses can not well be estimated, and as the number of light-ships increases these benefits will increase accordingly. The difficulties which have hitherto prevented connecting by electric cable a vessel swinging at anchor with the land are said to have been overcome by attaching the core

of the cable to the anchor chain and making a conductor of the latter. The leakage of electricity produced by the water has also been reduced to a minimum.

WITH a view, probably, to influencing the market for railway stocks, a report has been circulated in New York about a great shortage in shipments of anthracite coal by lake from Buffalo and Erie to the north-west. It is claimed that lake shipments up to date have been but little over 40 per cent of the usual amount, and that the coal must be carried by rail during the fall and winter, promising an unusually large tonnage of that description. This is entirely erroneous, and it is surprising that publications like the Engineering and Mining Journal will print such stories. The monthly statements of shipments of anthracite by lake from Buffalo show that the aggregate on Oct. 1 of this season was 22,530 tons in excess of the movement on the same date in 1892, and a similar increase has undoubtedly been made at Erie, where the shipments are, of course, of far less importance. There is something of a shortage, as compared with last season, in the lake shipments of soft coal but none in hard coal.

IN THE second of a series of articles in the Engineer of London on "Ship Building in America," there is printed a very large amount of statistical matter relative to the commerce of the lakes. The commerce of the Detroit river is compared with that of London and Liverpool, and there is also a comparison of the Suez and St. Mary's Falls canal traffic. In sharing credit with Hon. Geo. H. Ely of Cleveland, Secretary Keep of the Lake Carriers Association and Mr. W. A. Livingstone of Detroit for the collection of a great mass of data of this kind, the REVIEW is pleased to note that, although few people realize the great labor involved in such work, it is highly beneficial in directing attention to the lake marine.

## The Sailor's Consolation.

One night came on a hurricane,  
The sea was mountains rolling,  
When Barney Buntline turned his quid,  
And said to Billy Bowling:  
"A strong nor'wester's bowling, Bill;  
Hark! don't ye hear it roar now?  
Lord help 'em! how I pities all  
Unhappy folks on shore now!

"Foolhardy chaps who live in town—  
What danger they are all in!  
And now are quaking in their beds  
For fear the roof should fall in.  
Poor creatures! how they envies us,  
And wishes, I've a notion,  
For our good luck, in such a storm,  
To be upon the ocean.

"But as for them who're out all day,  
On business from their houses,  
And late at night are coming home  
To cheer the babes and spouses,  
While you and I, Bill, on the deck  
Are comfortably lying—  
My eyes! what tiles and chimney-pots  
About their heads are flying!

"And very often have we heard  
How men are killed and undone  
By overturns of carriages,  
By thieves and fires, in London.  
We know what risks all landmen run,  
From noblemen to tailors;  
Then, Bill, let us thank Providence  
That you and I are sailors!"

Mr. M. A. Bradley, president of the Cleveland and Buffalo Transit Company, says that the whaleback passenger steamer Christopher Columbus is in no way fitted for the business of the C. & B. company, and that the directors have no intention of purchasing her.



### Around the Lakes.

A 6-inch steam fog whistle will be sounded from Superior pier head light station after the 15th inst.

A steel electric launch, 38 feet long, was recently finished by the Detroit Boat Works, Detroit, for Hiram Walker.

Announcement of the embarrassment of David Bell, Buffalo ship builder, caused general regret among vessel men.

West Superior, Wis., will be the port of hail of the Northern line passenger ships being built by the Globe Iron Works Company.

On a draft of 16 feet 2½ inches the whaleback barge Sagamore a few days ago delivered at Cleveland from Escanaba 3,368 gross tons of ore.

A despatch from Oswego says that harbor improvements just finished by the government insure a draft of 17 feet in a channel 200 feet wide from the lake to the grain elevators.

Only one new lake craft, the sloop yacht Peri, was recorded in the books of the office of the commissioner of navigation, Washington, last week. She is of 8.50 tons gross and 8.07 net and the official number given to her is 150,641.

For probably the first time in five years a monthly supplement to the Inland Lloyd's Register was issued on the 1st inst. without the rating of a single new vessel. This is certainly a forcible illustration of the dullness in lake ship building.

Capt. Nelson A. Peterson, who has had charge of the Milwaukee life saving station for a number of years, will probably lose his position on account of charges of gross neglect of duty, under which he was subjected to an investigation recently.

The American schooners Albert T. Stearns and Nellie F. Sawyer and the British schooner Sir Hibbert, all three-masted, were classed last week by the American Shipmasters' Association publishers of the Record of American and Foreign Shipping.

Capt. Collins of the steamer William Edwards, and Capt. F. A. Bailey of the J. B. Lyon, joined the Ship Masters' Association at a special meeting at Buffalo Thursday. Last year the association paid out in benefits to widows and orphans of deceased members \$20,000.

Nov. 28 will be the fiftieth anniversary of the launching of the old man-of-war Michigan, the only naval vessel on the lakes and the people of Erie, Pa., will make arrangements to celebrate the event as soon as the boat returns to that port from the World's Columbian Exposition.

Mr. H. R. Rogers, general passenger agent of the Cleveland & Buffalo Transit Company, announces that the regular passenger fare between Cleveland and Buffalo beginning with October 1 is \$2. This will deduct \$1 from all single and round trip fares shown in the company's through passenger tariffs.

In docking the big steel freight steamer Merida, one of the three duplicate Wheeler boats that are the longest on the lakes, the larger basin at the yard of the Ship Owners' Dry Dock Company was taxed to its full limit of length, and the management is now considering the advisability of lengthening this dock.

Although there are several measures before Congress providing for the construction of two revenue cutters for the lakes, the steamer Perry, the only boat of any account belonging to the service, has been ordered from Erie to Behring sea. The Perry is now on her way to New York to receive repairs before going to the Pacific.

Hard coal shipments from Buffalo during September slightly exceeded the quite large amount sent forward in September last season, so that the lead for 1893 is larger than at the beginning of the month. The entire amount to Oct. 1 this season is 1,820,583 tons, against 1,797,953 tons to the same date last year, an increase of 22,530 tons.

From the opening of navigation to Oct. 1, there was carried on the Erie canal from Buffalo to New York an equivalent of 34,400,000 bushels of grain, against 21,000,000 during the same period last year and 24,000,000 bushels the previous year. The increase is, of course, due mainly to the maintenance of rates this year on this class of freight by railways operating between Buffalo and the seaboard.

The Lake Line Agents' Association of Chicago has forwarded a communication to the secretary of war, asking that he take action in widening the river at Taylor and North Halsted street

bridges, so as to open the north and south branches to boats of the size now building on the lakes, citing as argument the case of the steamer Centurion. As the United States government has assumed jurisdiction over the river, the association asks the secretary of war to use his authority in removing these obstructions to navigation, which are owned and controlled by the city of Chicago.

Wheat receipts at Buffalo during September were about 6,000,000 bushels less than in September, 1892, while the decrease in corn receipts was 541,912 bushels. For the entire season from the opening of navigation to Oct. 1 receipts of all grain aggregated 71,626,042 bushels. For the same period last year they were 92,713,444 bushels. Including flour as wheat this season's receipts to Oct. 1 amount to 123,896,762 bushels, as against 124,497,359 bushels on the same date last year, or a decrease of 600,597 bushels.

The new station for the Lynn Gas and Electric Company at Lynn, Mass., will be built by the Berlin Iron Bridge Company of East Berlin, Conn. The dynamo room is 58 feet wide by 157 feet long, the whole space being controlled by a traveling crane. The boiler room will be 48 feet wide and the same length as the dynamo room. The roof of this building will be entirely of the Berlin company's patent anti-condensation corrugated iron roofing, which seems to be in great favor with electric light and power companies, as it is fire proof and at the same time no condensation will form on or drop from the under side of the corrugated iron. This is believed to be the only fire proof roof made where this condition can be guaranteed.

### A Letter Worth Reading.

A column might be used to describe the Cincinnati automatic steam steering gear, but the following letter is more to the purpose:

BUFFALO, N. Y., Sept. 25, 1893.

MESSRS. CRAWLEY & JOHNSTON,  
Cincinnati, Ohio.

GENTLEMEN:—In reply to your inquiry as to the working of the Cincinnati automatic steam steering gear which you placed on the steamer John B. Lyon, I will say that it affords me great pleasure to state that I am very much pleased with it. We can handle our rudder very fast with ease. While the gear is very powerful, it works without noise or jar. It is simple and requires very little attention. As far as I can see there is not much liability for any of the parts to break. In conclusion I will say the gear is a perfect success and I shall cheerfully recommend it as the best steering gear I have ever seen.

F. A. BAILEY,

Master, steamer John B. Lyon.

The owners of the steamer John K. Speed have decided to discard the steering gear which was placed on the boat when she was built and have contracted for one of the Cincinnati automatic steam steering gears, which are built by Crawley and Johnston of Cincinnati. The Speed is one of the largest Mississippi river boats.

### Single or Double Decked Boats.

EDITOR MARINE REVIEW:—Would you be kind enough to explain the difference between a single and double decked boat. I claim that the line boats, such as the Delaware and New York, are double decked boats. If these boats are not double decked boats please tell me what they are called.

Lorain, O., Sept. 27.

A Reader of the REVIEW.

Our correspondent is mistaken. The line boats, or boats engaged in the package freight business, are not double decked boats. They are more properly single decked boats with the deck housed in. The big steel and wooden steamers engaged in the ore and grain business are double decked boats, as they have two working decks within the hull, one called lower or main deck and the other upper deck.—ED.

YOU MIGHT WALK—But it will be cheaper to take the Nickel Plate road's one fare excursion to the World's Fair, Oct. 12th. No extra charge for fast time.

IF YOU WISH TO TRAVEL CHEAPLY—Take the Nickel Plate road's one fare excursion to Chicago Oct. 12th. Three trains each way every day.

ONLY THREE WEEKS MORE—And the World's Fair will be over. Get ready and take Nickel Plate road's one fare excursion Oct. 12th.

Subscribe for the official report of the Engineering Congress through the Marine Review. Price \$10. Sold only on subscription. Must be ordered in advance, to be paid for when delivered.



## A World's Fair Exhibit.



The exhibit of the Penberthy Injector Company in machinery hall, world's fair, is shown in the accompanying illustration. The manner in which this exhibit is gotten up is a credit to the enterprise of this popular firm. Their space is inclosed by a handsome booth or pagoda painted in delicate shades of terra cotta and blue. They show an injector in actual operation on a boiler furnished by the Lennox Machine Company, Marshalltown, Ia. They also exhibit a full line of sizes on shelving at one side of the exhibit. On the lower shelf are their largest size injectors and on each shelf above are machines of a size smaller than on the shelf below. The center of the exhibit is occupied by two pyramids made up of their Safety crank pin oilers and IXL oil cups, while the railing across the front of the booth is composed of injectors and oil cups fastened together, making a very pleasing and unique feature. The corner posts are made of their largest machines size FF. From the ceiling hangs a line of their oil cups and above the front of the booth is a handsome and ornamental sign, calling the attention of the visitor to the character of the exhibit and the name of the exhibitors. This company has eight of their FF injectors on the Heine battery of boilers, composing part of the power plant of the exhibition. These eight injectors furnish 24,000 gallons of water per hour, and they should be seen at work by any one interested in this line of goods. The exhibit is now in charge of the company's manager, Mr. S. Olin Johnson, assisted by their traveling salesman, Mr. William O. Lee, and any one interested in this line of goods is invited to call at this exhibit, where they are assured of a hearty reception.

## In General.

Boilers of the U. S. S. Chicago, now absent on the European station, are only seven years old, but they are said to be in so bad a condition as to require her immediate return for repairs. Defects are thought to be due to inherent weakness or careless use.

Within the past month, no less than four new vessels have been added to the navy of France. The first of them, the Chas. Martel, is a first class battle ship; the Bugeand, a second class protected cruiser; the D'Iberville, a torpedo catcher and the Lansquenet, a large and fast torpedo boat.

Great Britain's new cruisers Powerful and Terrible, provided for in the navy estimates of 1893-4, will be 500 feet long and 70 feet wide, with a displacement of 14,000 tons at a mean draught of 27 feet. The continuous sea steaming speed is to be 20 knots. On a basis of 2 horse power per ton of displacement they will require 28,000 horse power.

The Engineers' and Naval Architects' Society, a new branch of the Franklin Institute of Philadelphia, held its first meeting last week and perfected an organization by electing officers, R. W. Newman being elected president. The society was first organized as the Penn Institute of Engineers and Naval Architects, at Cramps, and the change to the Franklin Institute was made at the suggestion of Mr. E. S. Cramp.

Some idea of the cost of maintenance of a big steamship line may be gathered from the latest figures of the North German Lloyd Company, which claims to own 242,367 tons of steamships, including twelve now in process of construction, and operate twenty-two different lines to various parts of the world. During last year the provisions used by these ships cost more than \$1,500,000; 760,000 tons of coal were burned; 203,000 passengers and 684,000,000 grammes of mail matter were carried on the company's various lines, and the entire distance covered by the steamers was 2,840,826 nautical miles, or 131 times the circumference of the earth.

It is extremely probable now that those two small boat navigators who started to work their way to Europe in the fashion

of tramps ashore, depending upon passing vessels for provisions, etc., have been drowned in the August gales. One of them, it will be remembered, was Julius Gardner, who started from Shelburne, Nova Scotia, for Falmouth, England, in a 16-foot dory about the last of June, and the other was Chris. Paulsen, who left New York about the middle of August in a somewhat similar craft. Gardner was reported a number of times shortly after he sailed, but nothing has been heard of either him or Paulsen since the latter got away. We would hardly say "it served them right," but they certainly tempted Providence.—Marine Journal.

## Relative Cylinder Proportions.

A writer of "Current Comment" in Cassier's Magazine has this to say on the question of relative cylinder proportions: "The proper proportions of the cylinders depend to an appreciable extent on the total ratio of expansion adopted, and the latter in turn depends upon the initial steam pressure used. Still, there is a very wide discrepancy in the dimensions of cylinders chosen for even the same boiler pressures by various designers. From figures recently gone over and bearing principally on English practice, it appears that in one instance a firm, working with 150-pound boiler pressure, use a ratio of low pressure to high pressure cylinder of 6.7, while another firm, for the same pressure, adopt in one case a ratio of 8, and in others ratios of from 6.2 to 6.8. In the case of one much-spoken-of English steamship the boiler pressure is 115 pounds, and the ratio of high pressure cylinder to low pressure cylinder is 5.4. With 140-pound boiler pressure, one eminent firm adopts a ratio of 6.1, and another with a boiler pressure of 135 pounds makes the ratio 6.4. Of course, some variations in practice are to be expected, but they can not all be right. Evidently rule-of-thumb work is largely predominant in the matter and the cylinder ratio problem is yet far from having been rationally solved."

## Water Tube Boilers.

Among the boilers furnished by the Roberts Safety Water Tube Boiler Company to the United States government have been one for the United States dredge Ohio on requisition of Mr. E. J. Carpenter, assistant engineer, U. S. A., about two years ago, and followed by an order for the duplicate boiler for the United States dredge Oswego this year. This company also furnished one of their boilers for fog whistle purposes to Col. William Ludlow, for use in the Detroit district of the lighthouse department. Another has lately been received by Capt. H. F. Hodges, U. S. A. Sioux City, Iowa, for use on a snag boat. The launch plying between Washington navy yard and the gun proving ground at Indian Head also contains one, and two more are now ready for delivery to Capt. Frederick Rodgers, U. S. N., for harbor service, and to Past Assistant Engineer Albert F. Dixon, U. S. N., for use on the new commandant's barge at the Brooklyn navy yard. One of these boilers is also used in the torpedo planter ordered by Col. King of Willet's Point last year.

## Rules Regarding Water Tube Boilers.

According to the latest rules promulgated by the officers of the steamboat inspection service, all drums attached to coil, pipe, sectional, or water tube boilers, must have heads of wrought iron or steel, flanged and substantially riveted to the drums; or secured by bolts and nuts of equal strength with rivets, in all cases where the diameters of such drums exceed 6 inches. Coil and pipe boilers will hereafter be subjected at inspection to a hydrostatic pressure double that of the steam pressure allowed in the certificate of inspection.

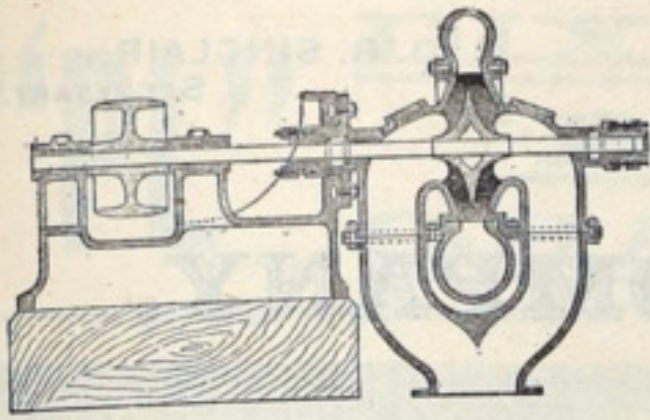
One of the most recent applications of the Serve tube has been made in connection with some of the fast locomotives of the Paris, Lyons and Mediterranean railroad in France, the object sought having been the reduction of weight of the engines without sacrificing steam capacity, and from published French accounts, the results appear to have been all that could be desired. The use of the tubes permitted shortening of the boilers without detracting from their evaporative power.

## FOR SALE CHEAP....

Two new Steel Scotch Marine Boilers, 12 ft. diameter, 11 ft. long, with Steam Drum, etc. Grate surface 61 feet. Sold for want of use Apply

**THE HARLAN & HOLLINGSWORTH COMPANY,**  
WILMINGTON, DEL.





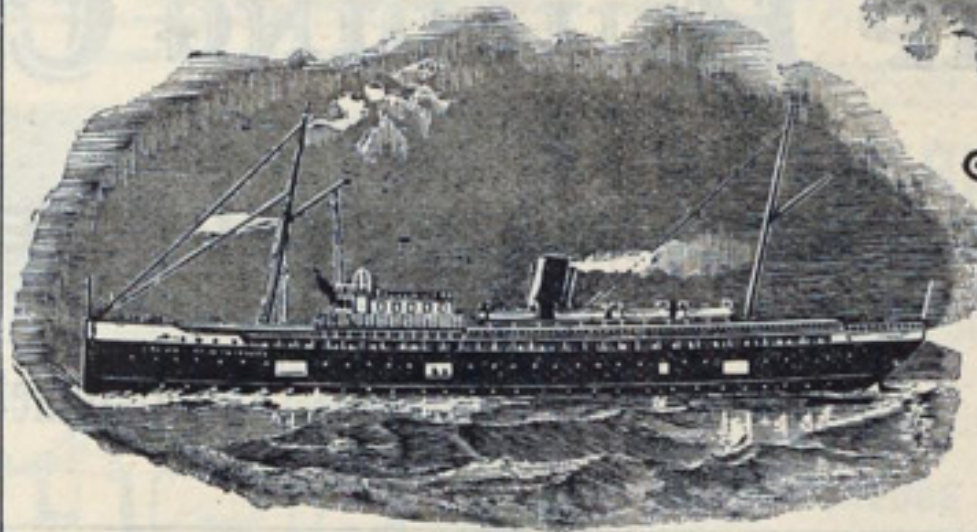
### Centrifugal Pumping Machinery

MANUFACTURED BY **LAWRENCE MACHINE CO.**

Adapted to requirements of contractors, wreckers, pumping out docks, cofferdams, and water bottoms of steel vessels. Address for catalogue and prices,

**R. H. ALDRICH, Engineer,**  
43 Builders' Exchange, BUFFALO, N. Y.

# *Ed. S. Richardson Fueling Co.*



DOCKS

FOOT NO. MARKET ST  
18TH ST. BRIDGE,  
ILLINOIS CENTRAL SLIP "C."

OFFICE, 54 LA SALLE ST.  
CHICAGO ILL.

## MARINE VALVE OIL

For Cylinder Lubrication is unsurpassed, and is used in 90 per cent. of the large steamers on the great chain of lakes.



Marine Valve,  
Renown Engine,

Eldorado Engine, Victor Signal,  
Crank Case, Dark Lubricating,  
Artic Cup Greases, and Lard Oils.

— CARRIED IN STOCK AT THE —

### Standard Oil Company's Marine Depot.

123 River Street, CLEVELAND, O.

TELEPHONE 77. MAIN OFFICE TELEPHONE 682.

ALSO FOR SALE BY

#### STANDARD OIL COMPANY.

No. 5 Wabash Ave., Chicago, Ill.  
Racine, Wis.  
Broadway & Mason, Milwaukee, Wis.  
Sheboygan, Wis.  
Manitowoc, Wis.  
Green Bay, Wis.  
Marinette, Wis.  
Oshkosh, Wis.  
Duluth, Minn.

West Superior, Wis.  
Hancock, Mich.  
Marquette, Mich.  
Sault Ste. Marie, Mich.  
Michigan Central Railway & 10th St.,  
West Bay City, Mich.  
Eighth & Sears Sts., Saginaw, Mich.  
46 Jefferson, Detroit, Mich.  
Summit & Monroe Sts., Toledo, O.

ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.  
D. ROBESON, Port Huron, Mich.  
W. S. McKINNON, Ashtabula Harbor, O.  
HULL & RAND, Huron, O.

STANDARD OIL COMPANY, Star Oil Works, Buffalo, N. Y.  
BABY & DALE, St. Clair, Mich.  
N. C. ALTEN, Lorain, O.  
A. F. HARRINGTON, Conneaut Harbor, O.



A. H. MCGONAGIL, South Chicago, Ill.  
MARINE SUPPLY Co., Fairport, O.  
F. KRANZ, Sandusky, O.  
THE M. I. WILCOX CORDAGE & SUPPLY Co., Toledo, O.

**F. W. WHEELER,**  
President.

**E. T. CARRINGTON,**  
Vice-President.

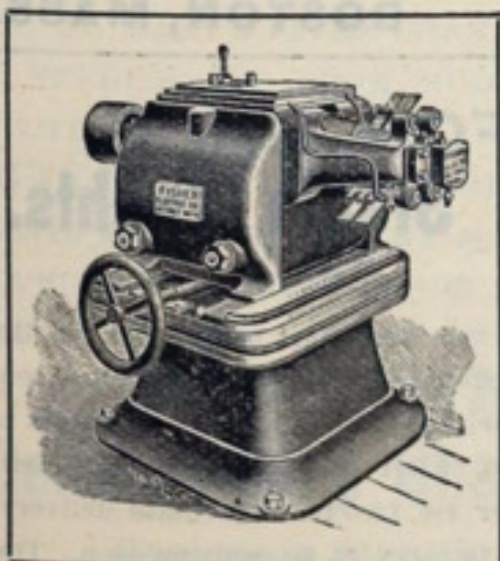
**F. L. GILBERT,**  
Secretary.

## F. W. WHEELER & CO.,

WEST BAY CITY, MICH.

Builders of all kinds of METAL AND WOODEN SHIPS.

THE following Passenger Steamers employed at the **WORLD'S FAIR** are equipped with our Lighting Plants: We invite our friends and prospective customers to make an inspection of these Plants:



**CHRISTOPHER COLUMBUS**—Two 400 light direct-connected twin compound engines and dynamos with 800 lamps and search light.

**ARTHUR ORR**—Two direct-connected engines and automatic dynamos, 350 lamps.

**CITY OF TOLEDO**—Automatic belted engines and dynamo, 210 lights.

**Fisher Electric Co.** 183, 185 & 187 Larned Street, West, **Detroit, Mich.**



WILLIAM L. BROWN,  
PRESIDENT.

W. F. COBB,  
VICE-PRESIDENT.

W. I. BABCOCK,  
MANAGER.

O. R. SINCLAIR,  
SECRETARY.

# CHICAGO SHIP BUILDING COMPANY,

LONG DISTANCE TELEPHONES.

Ship Yard Office,  
"South Chicago 40."

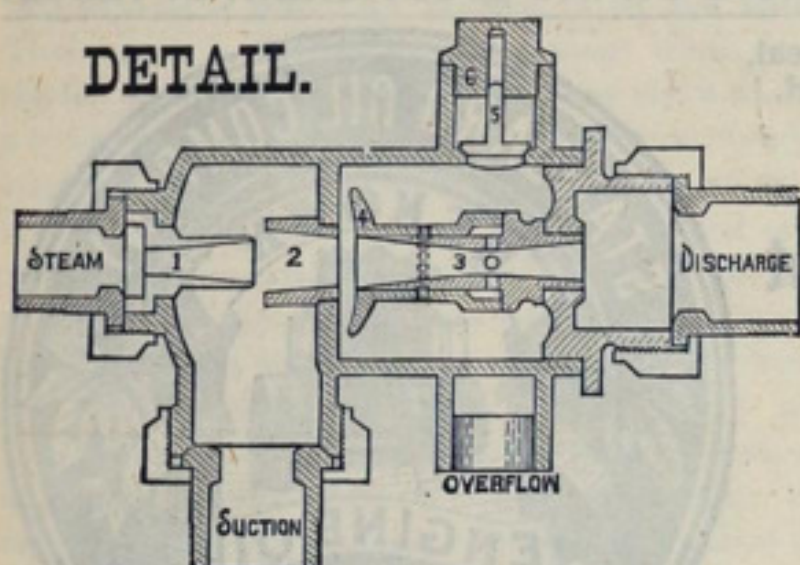
Chicago Office,  
1013 Rookery,  
"Main 3447."

STEEL STEAM-SHIP BUILDERS,

101st St. and Calumet River, SOUTH CHICAGO, ILL.

## The Globe Automatic Injector.

DETAIL.



See the SIMPLICITY OF IT!

SUPERIOR FOR  
MARINE BOILERS.

Write for Particulars.

Eagle Lubricator Co.  
MANUFACTURERS,

108 Canal St., - Cleveland, O.

## THE "CINCINNATI" AUTOMATIC STEAM STEERING GEAR

A Simple, Powerful Machine. Noiseless and Sure.

SEND FOR  
CIRCULAR.

CRAWLEY & JOHNSTON,  
119-121-125 E. Pearl St., CINCINNATI, OHIO.

GEORGE B. CARPENTER.

ESTABLISHED 1840.

BENJAMIN CARPENTER.

## GEO. B. CARPENTER & CO.

### Ship Chandlers and Sail Makers.

CORDAGE, TWINES, COTTON DUCK,  
MILL, RAILROAD and VESSEL SUPPLIES.

202, 204, 206, 208 SO. WATER STREET,  
CHICAGO, ILL.

## H. G. TROUT KING IRON WORKS,

BUFFALO, N. Y.,

MANUFACTURERS OF

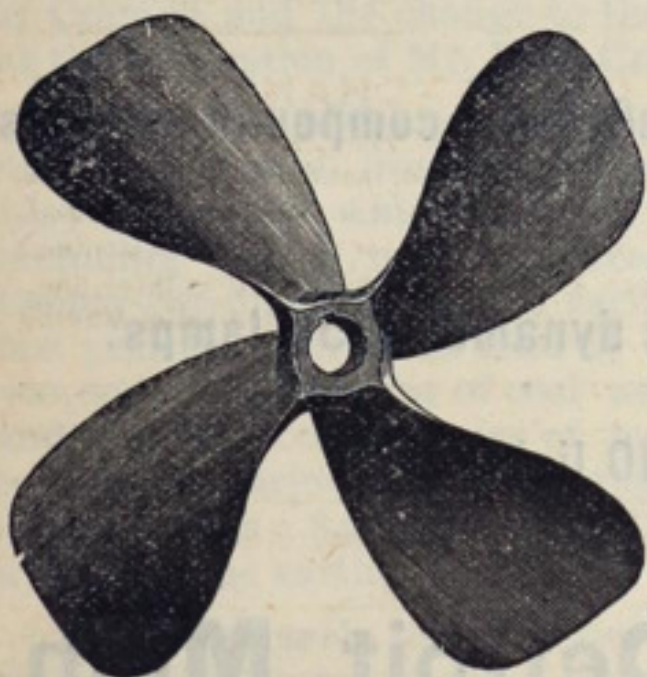
TRIPLE EXPANSION,  
THREE CYLINDER,  
FORE AND AFT  
And STEEPLE COMPOUND  
MARINE ENGINES,

High and Low Pressure Engines,  
Sectional, Propeller,  
Tug and Yacht Wheels.

Cowles Aluminum and Manganese  
Bronze Propeller Wheels.

These Wheels are noted for their extra  
speed, towing power and propo-  
tionate saving of coal.

PRICES QUOTED ON APPLICATION.



## THE JENKS SHIP BUILDING CO.

Will have FOR SALE OR CHARTER by the beginning  
of navigation, 1893,

### THREE (3) STEAMERS

Especially Designed for the Lumber Trade.

If interested, address them at PORT HURON, MICH.

## C. H. McCUTCHEON,

(Successor to SAMUEL McCUTCHEON.)

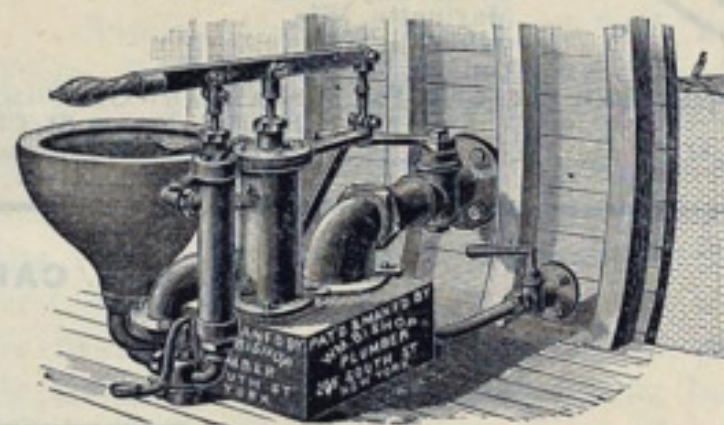
Copper, Tin and Sheet Iron Manufactory,  
Steamboat and Engineers' Supplies.

All kinds of Brass Cocks, Globe Valves and Couplings, &c. Iron Pipe and Fittings, and  
Mill Supplies. Rubber Belting, Hose and Packings, Springs, Valves, &c.,  
Leather Belting and Usudurian Packing.

Telephone No. 68.

No. 18 Ohio Street BUFFALO, N. Y.

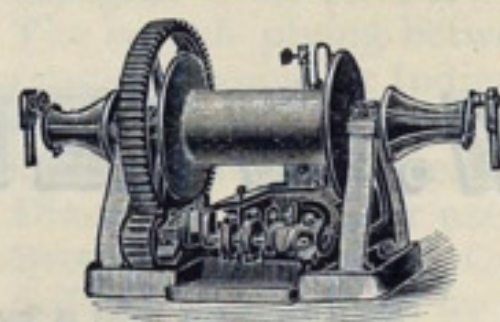
## COMBINATION PUMP WATER CLOSET



For Yachts, Pilot Boats,  
Naval Ships, Etc.

For above or below water line. No  
tank needed, and when below water  
line you can flush bowl without hav-  
ing to use pump.

WILLIAM BISHOP,  
Plumber, Coppersmith & Steam Fitter,  
Telephone 4811 Cortlandt,  
205 South Street, NEW YORK.  
Yacht Fittings a Specialty.



JACKSON & CHURCH,  
Builders of DUPLEX HOISTING and DECK ENGINES.

Plain Finished and Automatic ENGINES, From Heavy Patterns  
at Moderate Prices.

Vertical, Horizontal, BOILERS Strictly First-Class  
Marine & Locomotive and Highest Test.

Send for Circulars and Prices. SAGINAW, MICH.



## SHIP LAMPS.

OIL AND ELECTRIC FIXTURES

FOR  
Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.,

(FORMERLY WILLIAMS, PAGE & CO.)

227 to 233 Cambridge St.,

BOSTON, MASS.

## Haycox Sight Connection

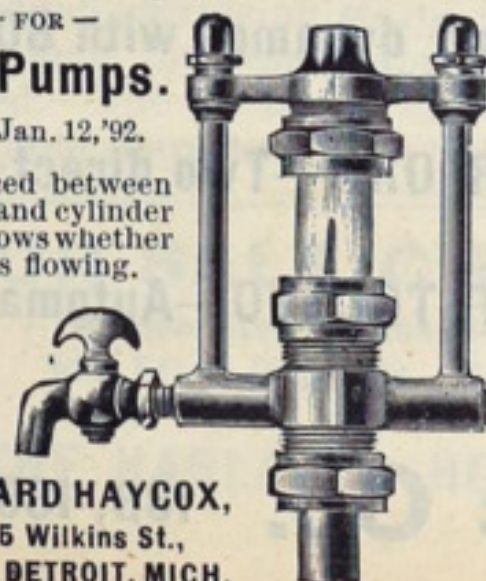
— FOR —

### Oil Pumps.

Pat. Jan. 12, '92.

Is placed between  
pump and cylinder  
and shows whether  
oil is flowing.

Write for  
Prices and  
Circular.



EDWARD HAYCOX,  
145 Wilkins St.,  
DETROIT, MICH.

## FOR SALE. Ten Steam Yachts.

Now in use carrying passengers at the  
World's Fair, Chicago. Will sell and con-  
tract to deliver them afloat in any waters in  
the U.S., after the close of the fair,  
November 1st, two for immediate delivery.  
Licensed to carry 75 passengers each. The  
chance of a lifetime for anybody wanting  
a steam yacht. CHAS. P. WILLARD & CO.,  
Clybourn and Southport Aves., Chicago, Ill.



# "PL" DIXON'S "PL" GRAPHITE.

Dixon's Perfect Lubricating Graphite is indispensable to every engineer and machinist. It can be used dry or mixed with water, oil or grease. We send free of charge a sample and pamphlet with interesting and instructive information.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

RELIABLE OIL & GASOLINE

**TORCHES**

FOR BOATS & DOCKS.

THE SCHNEIDER AND TRENKAMP CO.  
CLEVELAND, O.

ILLUSTRATION FOR ALL PURPOSES

**The NATIONAL UNION Photo Engraving Co.**

Photographs and Drawings reproduced for all kinds of Printing.

*Cleveland, O.*

1880. 1893.

**CHAS. H. POTTER & CO.,**  
**Investment Bankers,**  
**Cleveland, O.**

Dealers in

**Lake Superior Iron Mining Stocks,**

on about 10 per cent. annual dividend basis, Republic Iron Co., Lake Superior Iron Co., Champion Iron Co., Minnesota Iron Co., Jackson Iron Co., Cleveland-Cliffs Iron Co., Chandler Iron Co., Chicago and Minnesota Ore Co.

**CONNELLY BROS. & CO.**

OHIO, Cor. Michigan St., BUFFALO, N. Y.

**SHIP CHANDLERY, PAINTS, OILS,**  
**AND VESSEL SUPPLIES.**

ST. MARY'S RIVER CHARTS NOS. 1 AND 2 FROM POINT IROQUOIS TO E. NEEBISH AND FROM MUD LAKE ENTRANCE TO E. NEEBISH, CORRECTED TO AUG. 30, 1892, CAN BE HAD AT THE OFFICE OF THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, FOR 20 CENTS EACH, OR BOTH BY MAIL FOR 50 CENTS. BOTH CHARTS WILL BE FURNISHED WITH CLOTH BACKS AND BOUND EDGES FOR \$1.50.

**H. CHANNON COMPANY,**  
**General Ship Chandlers and Sail Makers,**

Dealers in Manilla Rope, Wire Rope,  
Tackle Blocks, Cotton Duck, Anchors, Chains, Etc.

24-26 MARKET STREET, CHICAGO, ILL.

## AMERICAN CHAIN CABLE WORKS.

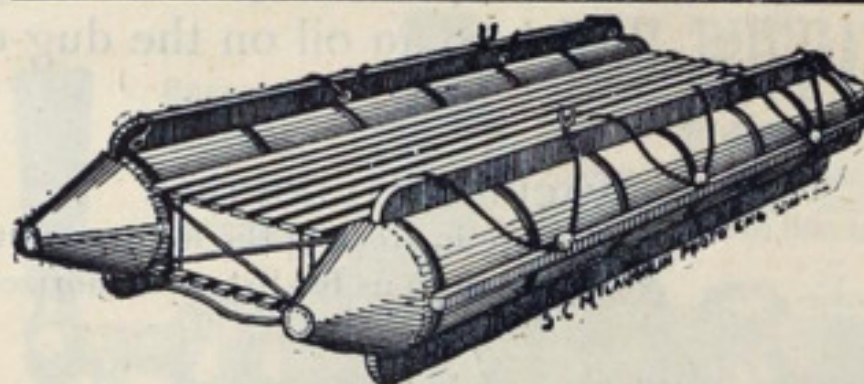
ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

### CHAINS.

Our DREDGE and CRANE CHAINS are made of IRON ROLLED SPECIALLY for that purpose. Send for Price List.

J. B. CARR & CO., Manufacturers, TROY, NEW YORK.



**Thos. Drein & Son,**  
BUILDERS OF

Metallic Life Boats and Rafts,  
Government and Pleasure  
Boats. Block and Granulated  
Cork Life Preservers. Outfit  
for Lake Steamers a Specialty.  
TATNALL & RAILROAD STS.  
Wilmington, Del.

## No. 4 BECK Steam Steering Gear.

Extracts from Letters.

"THE steering gears of the lakes."  
Capt. Higgin, V. O. T. Co., Chicago.

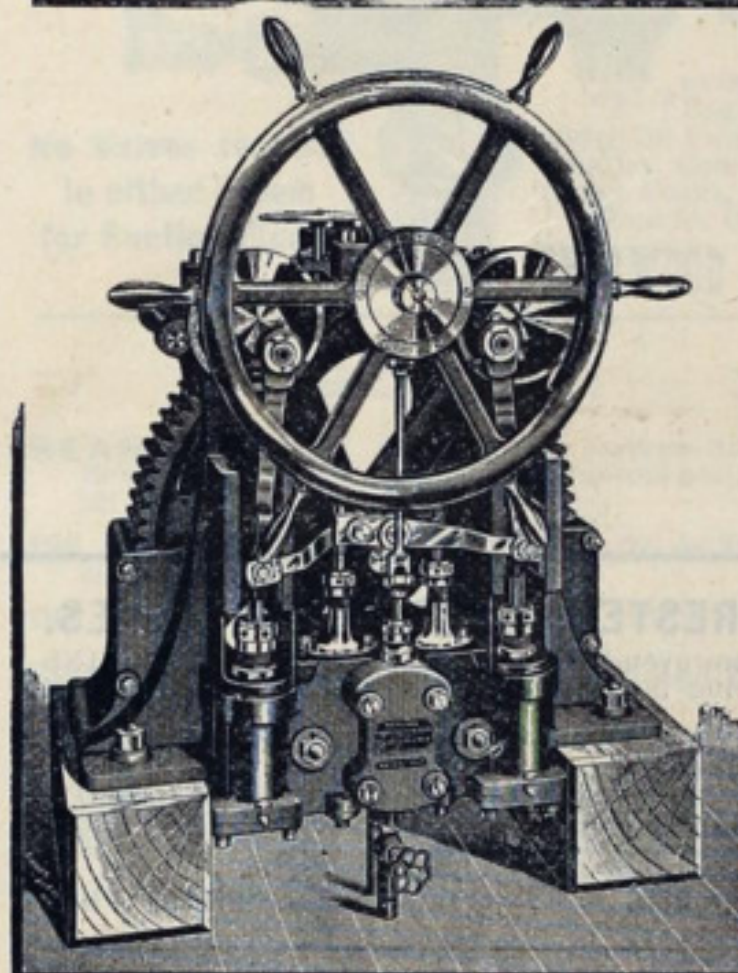
"Cannot be excelled."  
Capt. Cochran, Steamer Marion.

"Gives entire satisfaction."  
Independent Tug Line, Chicago.

"Are giving excellent satisfaction."  
Milwaukee Dredge Co.

"The No. 4 Beck Steering Gear put  
in our steamer, Samuel Mather, has  
given excellent satisfaction."  
W. L. Mahon, Mech'l Eng'r,  
American Steel Barge Co.

**PAWLING & HARNISCHFEGGER,**  
156-168 Clinton Street,  
MILWAUKEE, WIS.



## The Excelsior Machine and Cleveland Punch and Shear Works Co.

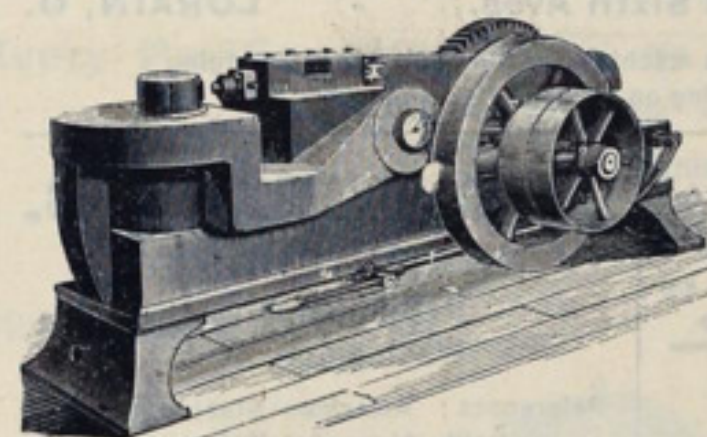
SUCCESSORS TO

**LEIGHTON & HATHAWAY.**

Manufacturers of

Punches, Shears, Bending  
Rolls, Rotary Planers, Over-  
head & Post Drill Presses.

980 to 986 Hamilton St.,  
CLEVELAND, OHIO.



## MARINE REVIEW LINER EXCHANGE.

Space under this heading may be used gratis by our advertisers or subscribers to call attention to vessels or any craft, machinery, new or second hand, that they may have for sale. Those wanting machinery of any kind or wishing to purchase vessels, are invited to take advantage of the same offer. Employers in need of professional men or men who want positions may avail themselves of the opportunities offered. Each item will be limited to three lines. Letters concerning same must mention number attached to item and be addressed MARINE REVIEW, 516 Perry-Payne Building, Cleveland, O.

217—FOR SALE—Dredge Erie, two dumping scows, one float scow, two Ingersoll-Sargent rock drills etc

219—FOR SALE CHEAP—Punch with 60-inch throat, and one engine driven with 18-inch throat.

220—Plate straightening rolls and a combined punch and shear with 25-inch throat for sale at a bargain.



## The Alaska Indian

Is thoroughly satisfied with his dug-out. It floats, and, best endorsement of all, suited his ancestors and he won't run any risk experimenting in making a change. Don't stick to an oil on the dug-out principle.

VACUUM MARINE OILS

Are in stock at the leading ports.

Send to us for list of authorized Agents.

VACUUM OIL COMPANY,  
Rochester, N. Y.



### TO THOSE INTERESTED IN, OR USING VALVES.

We have recently made improvements in the manufacture of JENKINS BROS. VALVES, having increased the number of bolts, thickness of flanges, etc.

We shall manufacture ONE GRADE OF VALVE ONLY, suitable for high or low pressure steam. The Jenkins Disc used in these valves are suitable for HIGH OR LOW PRESSURE. We guarantee all valves stamped with Trade Mark.

**JENKINS BROS.,**  
NEW YORK. CHICAGO. BOSTON and PHILADELPHIA.

MARINE WORK A SPECIALTY.

PRICES REASONABLE

### Lorain Machine and Repair Shop,

ED. A. FULLER, PROPRIETOR,

Broadway, between Fifth and Sixth Aves., - LORAIN, O.

Shop well equipped for repairs to machinery while boats are discharging and taking on cargoes.

**"ALL HANDS AFT."**  
Let me get your Patent, Trade Mark, or Claim for you. Honest and Good work is my pride.

EDWARD C. WEAVER, Atty.,  
900 F. (opp. Patent Office), WASHINGTON, D. C.

### PATENTS.

FRANK L. DYER,  
918 F. Street,  
Washington, D. C.

References: American Steel Barge Co.;  
Capt. Alexander McDougall.

J. D. WILSON.

M. HENDRIE

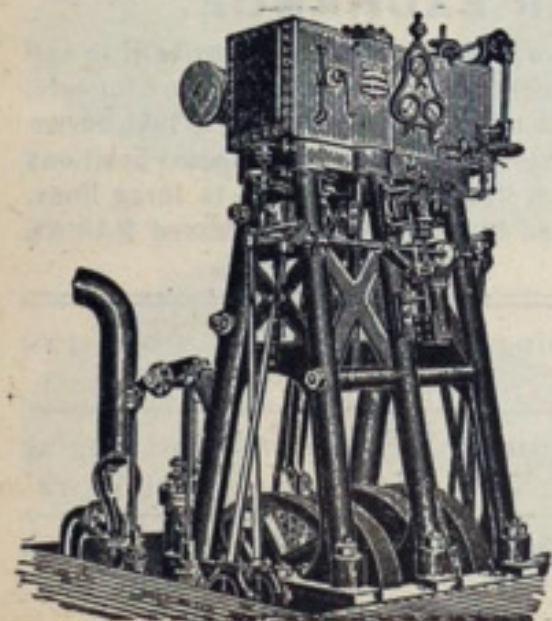
### MONTAGUE IRON WORKS,

MONTAGUE, MICH.

WILSON & HENDRIE, Proprietors.

MANUFACTURERS OF

MARINE :: ENGINES :: AND :: BOILERS,  
and General Mill Machinery.



**P. M. CHURCH & CO.,**  
SAVINGS BANK BLOCK, SAULT STE. MARIE, MICH.  
LEADING DEALERS IN

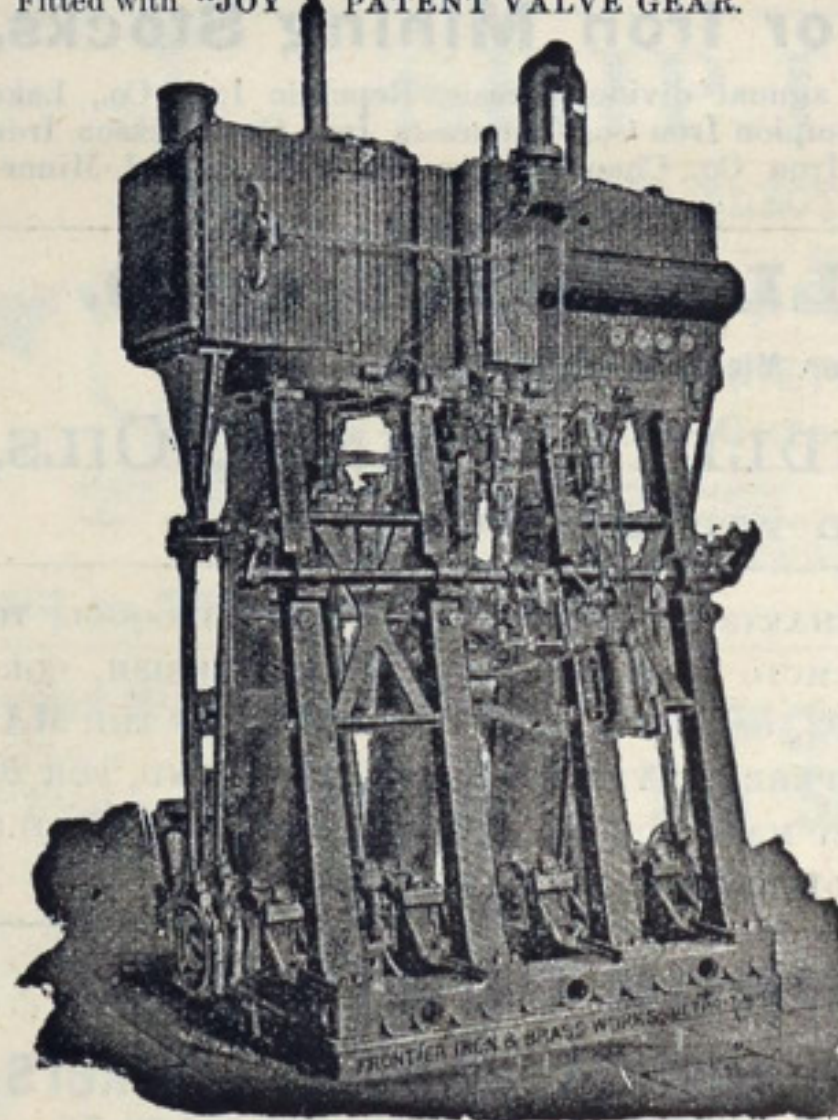
### Ship Chandlery,

Marine Hardware, Paints, Oils, Packings, Cordage, Etc.

FIRST-CLASS COPPERSMITH AND TINSHOP IN CONNECTION.

### THE FRONTIER IRON WORKS.

Fitted with "JOY" PATENT VALVE GEAR.



DETROIT, MICH.,

Builders of

### TRIPLE EXPANSION

and all kinds of

### Marine Engines

Engines furnished for  
Steamships:

T. W. Palmer, Livingstone, Majestic, Tampa, John Mitchell, Nyanza, Fedora, Geo. F. Williams, Mackinaw, Keweenaw, Jno. Harper, W. F. Sauber and Iosco. Panther, (fore and compound). Uganda, W. H. Gilbert, C. F. Bielman.

WHALEBACKS—

Samuel Mather, Pathfinder.

CORRECTED CHARTS OF THE ST. MARY'S RIVER CAN BE HAD FROM THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, O.

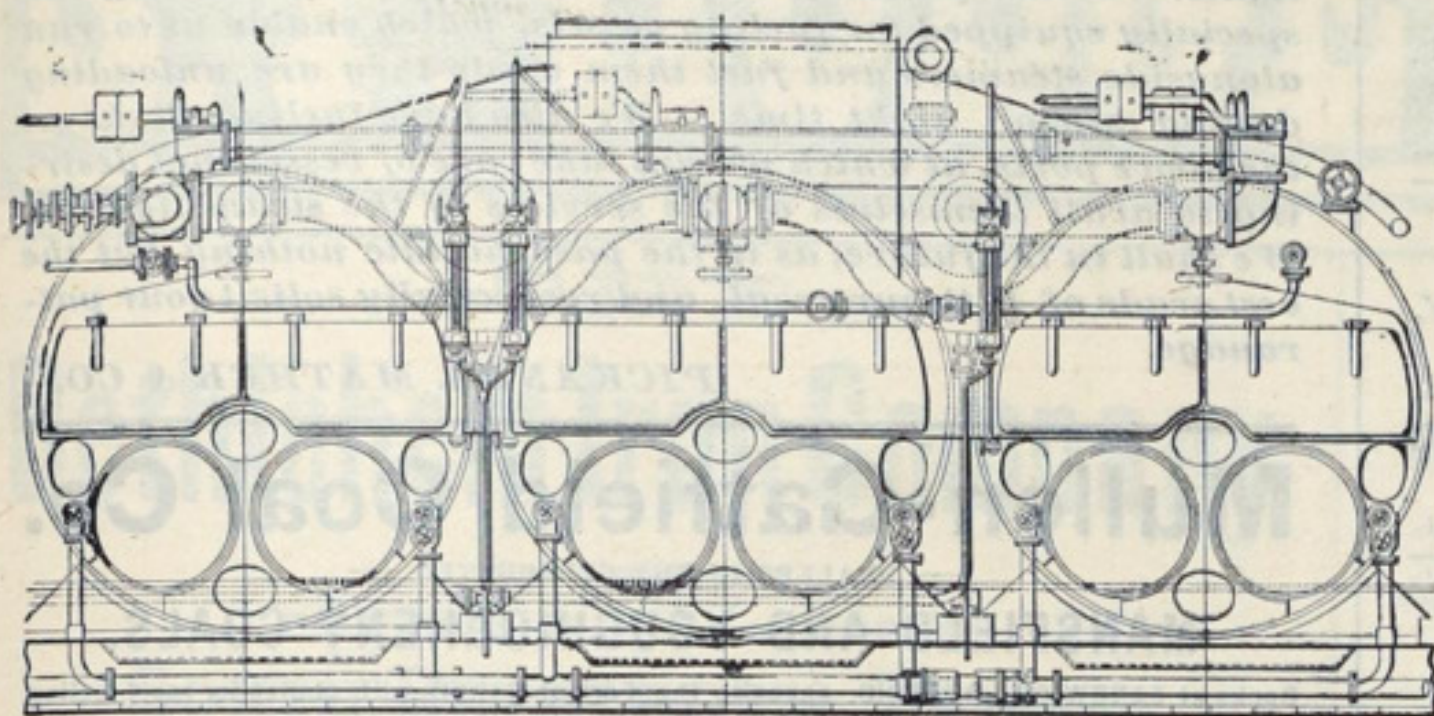


# LAKE ERIE BOILER WORKS, BUFFALO, N. Y.

## THE BEST EQUIPPED PLANT IN AMERICA

FOR THE MANUFACTURE OF

## MODERN MARINE BOILERS.



**THE Swain Wrecking Co.**  
E.M. PECK, Pres.

The TUG FAVORITE  
STATIONED AT CHEBOYGAN BEACH  
WITH COMPLETE WRECKING OUT-FIT  
IN CHARGE OF  
CAPT. MARTIN SWAIN.

THE CANADIAN WRECKER SAGINAW  
STATIONED AT DETROIT, MICH.  
CHARGED UP-TOP WRECK IN CANADIAN  
WATERS.

STEAM PUMPS AND SUB-MARINE  
WORK IN CHARGE OF  
JOHN S. QUINN.  
ARRIVED AT CHEBOYGAN, MICH.

**PARKER & MILLEN**  
DETROIT, MICH.

**4 STEAM PUMPS, 10 JACKS, 3 HAWSERS.**

1 COAL and OIL PUMP,  
3-1/2 INCH ROTARY  
1-1/4 INCH WORTHINGTON

**DIVING RIGS  
AND  
DIVERS  
ABOARD  
AT  
ALL TIMES**

JANUARY	FEBRUARY	MARCH	APRIL
MAY	JUNE	JULY	AUGUST
SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER

10-100 TON JACKS  
1-12 INCH HAWSER  
1-10  
1-12

Telegraph  
CAPT. M. SWAIN,  
CHEBOYGAN,  
MICH.

**TELEGRAPH  
PARKER & MILLEN,  
DETROIT, MICH.**

**THE BUFFALO AUTOMATIC.  
A GRADING INJECTOR.**

Operated  
entirely  
by One  
Handle.

The movement of the steam and water  
valves and their relative positions are  
such that the supply of water will always  
be in proportion to the supply  
of steam admitted to  
the jets. CAN BE GRADED  
to run continuously on any  
steam pressure from 20 to  
140 lbs. Operated entirely  
by one handle, both in stop-  
ping and starting, as well  
as in grading the supply of steam and water.

**No Valves required  
in either Steam  
for Suction Pipes.**

WAS 74  
Eagle Ejectors, Duplex Tube Scrapers, Cy-  
linder Oil Pumps Improved Glass Oil Cups and Lub-  
ricators, Compression Grease Cups, Improved Ball  
Gauge Cocks, and other Steam Users' Specialties.  
Send for Catalogue, mentioning this paper.

**SHERWOOD MFG. CO., (Sole Mfrs.) BUFFALO, N. Y.**

### BOOKS! BOOKS!

**SEAMANSHIP.** By Capt. Sir George S. Nares, K. C. B. R. N. Sixth edition, Revised and enlarged, with four hundred and twenty colored plates and illustrations, 291 pages, 8vo., cloth, \$3.00.

**THE RESISTANCE AND PROPORTIONS OF SCREW PROPELLERS.** By W. Bery. 4to, cloth, \$5.00.

**THE FOULING AND COROSION OF IRON SHIPS.** By Chas. F. T. Young. 8vo., cloth, \$3.00.

**SPON & CHAMBERLAIN, Publishers and Booksellers, 10 Cortlandt St., N. Y.**

No master trading to Lake Superior should be without a chart of the north shore. We have them for sale at \$1 each.

"The most perfect feed water heater and purifier we ever saw."—R. HAMMOND.

## IN PRACTICAL USE ON 25 LAKE STEAMERS.

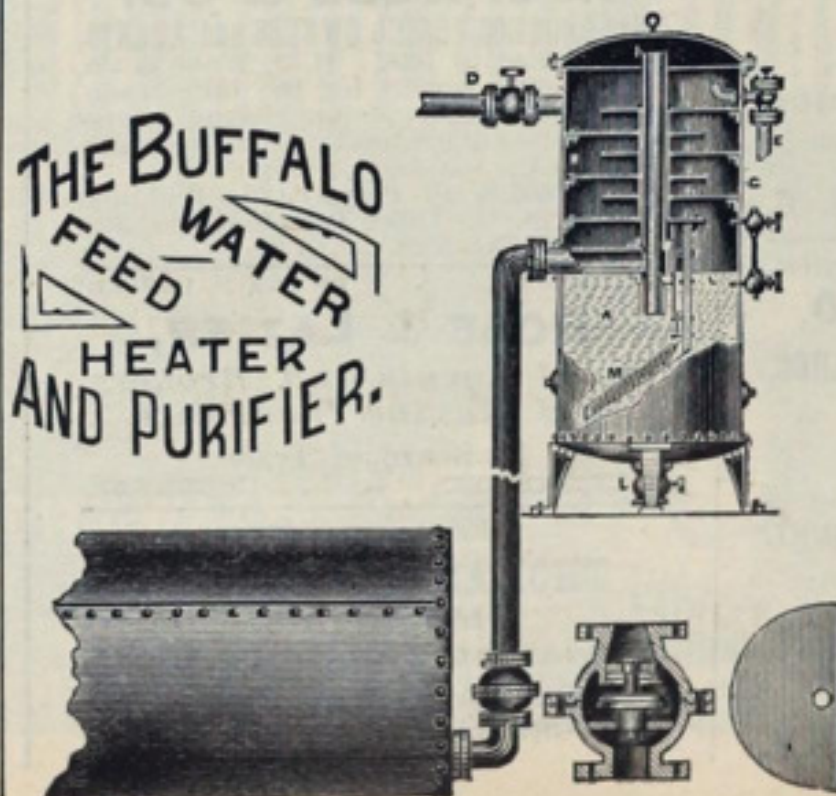
**Every Purifier Warranted to Remove all Sediment or Scale-Forming Substance.**

**ROBERT LEARMONTH** PATENTEE,

200 BOUCK AVENUE, - - - - - BUFFALO, N. Y.

### REFERENCES.

- A.—Settling chamber.
- B.—Boiler.
- C.—Feed pipe to boiler.
- D.—Steam pipe.
- E.—Water supply pipe.
- F.—Check valve.
- G.—Spray disks.
- H.—Spray chamber.
- I.—Equalizing tube.
- J.—Blow-off pipe.
- K.—Automatic shut-off valve.
- L.—Division plate.
- M.—Deflector and separator.



OWNERS AND CAPTAINS—If you want one of these handsome calendars mailed to you, send your address on a postal card, mentioning the REVIEW, to PARKER & MILLEN, Detroit, Mich.



**STEP FORWARD**  
AND OWN AN  
INDICATOR  
and know how to  
use it.  
Send for circular.

He is using the best  
till he has tried  
**EUREKA**  
PACKING  
For Steam, Water  
and Air.  
Send for Sample.

**NO  
MAN  
CAN  
SAFELY  
SAY**

HINE & ROBERTSON, 40 Cortlandt St., N. Y.

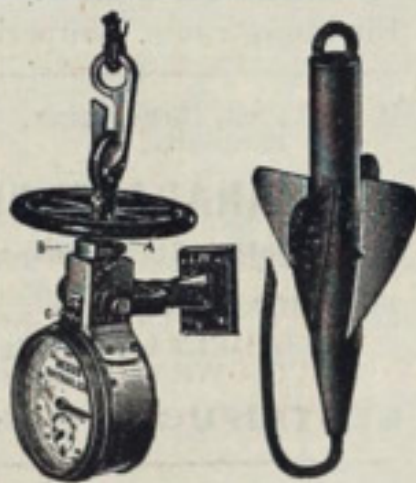
## T.S. & J.D. NEGUS

Have the largest and finest stock of Nautical Instruments and Charts in the United States.

Estimates given for  
Outfits of Steamers and  
Pleasure Yachts.

**Compass Adjusters.**  
Send for Catalogue  
and Almanac.

140 Water St.,  
New York City.  
Every attention given  
to Trade orders.



Try the new NEGUS LOG.  
Best in the World.

Special Agents for the Celebrated Ritchie Compass.



**HARVEY D. GOULDER,**LAWYER AND PROCTOR IN ADMIRALTY,  
CLEVELAND, O.W. H. COOK,  
CAPT. J. A. CALBICK,  
J. B. CLOUGH.**COOK, CALBICK & CO.**

Vessel Agents and Underwriters.

Tel., Main, 56. RIALTO BLDG., No. 23 Sherman St., CHICAGO, ILL.

**H. R. SPENCER,**

ATTORNEY AT LAW and PROCTOR IN ADMIRALTY.

218 Superior St., DULUTH, MINN.

**C. E. KREMER,** Attorney and Counselor-at-Law and  
Proctor in Admiralty.

Rooms 14, 15 and 16, Bryan Block, 164 LA SALLE ST., CHICAGO, ILL.

JOHN MITCHELL.

JOHN F. WEDOW.

ALFRED MITCHELL.

**MITCHELL & CO.,**

Vessel and Insurance Agents,

508, 509 and 510 Perry-Payne Building, CLEVELAND, OHIO.  
Office Telephone, 737. Residence, John Mitchell, 3506.WM. A. MOORE.  
WM. V. MOORE.  
JOHN H. GOFF.**MOORES & GOFF,** Proctors  
in Admiralty

Telephone 2565. 60-61 Moffat Block, DETROIT, MICH.

H. C. MASON.

**MASON & TAFT,**

F. L. TAFT.

ATTORNEYS-AT-LAW, Marine Collections a specialty.  
218 Society for Savings Bldg., Cleveland, O.  
TELEPHONE 876.**WM. H. MILLER,**ATTORNEY AND PROCTOR IN ADMIRALTY. Marine Collections.  
626 Society for Savings Bldg., Cleveland, Ohio.**JOHN PRINDIVILLE,**

Vessel and Insurance Agent,

12 Sherman Street,  
CHICAGO, ILL.

Telephone, Main, 129.

C. A. Macdonald.

J. J. Rardon.

**C. A. MACDONALD & CO.**

General Insurance Agents,

RIALTO BUILDING, CHICAGO, ILL.

H. S. LORD.

J. H. NORTON.

**LORD & NORTON,**Attorneys-at-Law,  
Proctors and Advocates in  
Admiralty,  
DULUTH, MINN.**White, Johnson & McCaslin,**ATTORNEYS-AT-LAW,  
—AND—Proctors in Admiralty,  
26-27 Blackstone Building,  
CLEVELAND, - OHIO.**THOS. WILSON,**

MANAGING OWNER

**WILSON'S TRANSIT LINE.**Gen. Forwarder.  
Freight and Vessel Agent.  
CLEVELAND, O.C. F. Palmer. Chas. Hutchinson.  
P. J. Minch.**PALMER & CO.,**Vessel Owners and Agents,  
(John H. Palmer and John T. Hutch-  
inson, Associates.)

Perry-Payne Bldg., Cleveland, O.

W. A. HAWGOOD. C. C. CANFIELD.

**HAWGOOD & CANFIELD,**Vessel Agents and Marine Insurance,  
604-605 Perry-Payne Bldg.,  
Cleveland, - Ohio.  
Telephone No. 2395.

Capt. LYMAN HUNT. JAMES P. HUNT.

**L. HUNT & SON,**Vessel Brokerage & Marine Insurance,  
Room 9, Exchange Building.  
Telephone No. 522.  
No. 202 Main St., BUFFALO, N.Y.**Law Offices.**

Notary Public and Stenographer.

**ORESTES C. PINNEY,**

Proctor in Admiralty,

521 & 522 Perry-Payne Bldg.,  
CLEVELAND, O.*W. L. Widdow*ATTORNEY-AT-LAW AND  
PROCTOR IN ADMIRALTY

Marine Notary.

**ASHLAND, WIS.**C. W. ELPHICKE. A. L. FITCH.  
JAS. A. MYERS.**C. W. ELPHICKE & CO.,**Vessel Owners and Agents,  
Marine Underwriters,Rooms 10, 11 and 12, 6 and 8 Sherman St.  
WHEELER BLOCK, CHICAGO.  
Telephone 1194.**E. T. HITCHCOCK,****Average Adjuster,**

184 Main St.,

**BUFFALO, N.Y.****Moore, Bartow & Gilchrist,****Ship Brokers & Agents,**Nos. 611 & 612 Perry-Payne Building,  
Superior Street. Cleveland, O.**H. J. WEBB & Co.**SHIP BROKERS, VESSEL OWNERS and AGENTS,  
Established in 1856. H. J. Webb & Co.  
will charter vessels for the lake trade.  
Special attention given to chartering ves-  
sels in the Lake Superior Iron Ore trade,  
both for the season and single trip.  
No. 606 & 607 Perry-Payne Building,  
Cleveland, O. Office Telephone No. 338,  
Residence No. 3228.

J. T. ROSE. FRANK B. LAZIER.

**ROSE & LAZIER,**Vessel Agents and Brokers,  
and Marine Insurance,16 Board of Trade,  
DULUTH, - MINN.

Established 1857.

**THOMAS MARKS & CO.,**

Merchants,

Forwarders and Shipowners,  
Port Arthur, Canada.N. B.—Special attention given to char-  
tering vessels.**To Owners and Masters of Steam Barges.**

We beg to call your attention to the fact that we have steam lighters at the ports of Cleveland, Ashtabula and Buffalo, specially equipped for fueling vessels, which enable us to run alongside steamers and fuel them while they are unloading during day or night time. We also have fueling docks at the above ports, at which we can take care of vessels not desiring to avail themselves of the services of the steam lighters. We shall in the future, as in the past, handle nothing but the best grade of Pittsburg coal, and respectfully solicit your patronage.

**PICKANDS, MATHER & CO.****Mullen-Gatfield Coal Co.**

— DEALERS IN THE CELEBRATED —

**MANSFIELD AND YOUGHIOGHENY COALS.**Docks at SANDWICH, ONTARIO, opposite the Fort at Detroit, with chutes for rapid fueling.  
Elevated docks and derrick at AMHERSTBURG, ONTARIO.**THE CUDDY-MULLEN COAL CO.,**Dealers in COAL. Docks at Government Pier, Whiskey Island, and Ad-  
joining Globe Dry Dock.All fully equipped with Revolving Derricks; also, Lighter Carrying Derrick  
and One Hundred Two and One-Half Ton Buckets.

Main Office, 81 Perkins Building, East Side of Main Street Bridge.

Dock Office, 127 West River St., Cleveland, O. Telephone No. 8.

Boats Coaled Day and Night. Docks at Amherstburg,

**Ohio & Pennsylvania Coal Co.**

FUEL DEPARTMENT.

MINERS AND SHIPPERS,

Youghiogeny and Ohio Steam Coals. Steamboats, Tugs, etc., Coaled day or  
night, DOCKS FOOT WEST RIVER STREET. WHISKEY ISLAND GOVERNMENT  
PIER and C. & P. R. R. SLIPS. Also STEAM LIGHTER—Equipped with  
Revolving Derrick and (100) two ton buckets.

Telephone 1608. Office, 130 West River St., CLEVELAND, OHIO.

**THE HUBBARD COAL CO.**

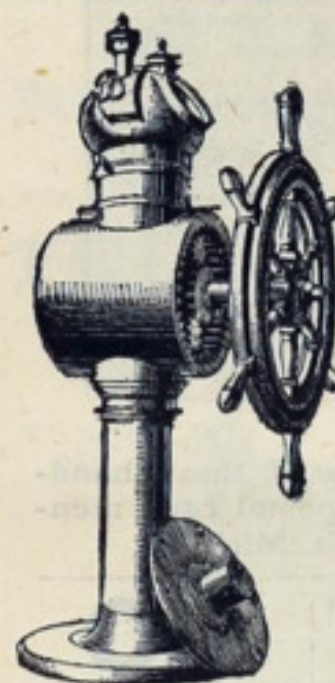
S. B. HUBBARD, Manager.

**WHOLESALE COAL. JACKSON OUR SPECIALTY.**

STEAMERS COALED.

Office with R. B. Hubbard &amp; Son, Wholesale Lumber,

SANDUSKY, OHIO.

**SNELLING'S  
PATENT  
STEERER**For Steamers, Ships,  
Tugs, Yachts, Coal  
Barges, Etc.The drum has power-  
ful internal gearing.  
No PURCHASE BLOCKS  
needed.Simple as the common  
"wheel and drum."  
Powerful as any Screw  
Steerer.An excellent relief or  
auxiliary gear for  
vessels that steer by  
steam.

Send for Circular.

J. H. SNELLING,  
158 South Street,  
NEW YORK.

"Cleveland to Buffalo while you sleep."

**Cleveland & Buffalo Transit Co.**

Magnificent Side Wheel Steel Steamers.

"State of Ohio," and "State of New York."

DAILY TIME TABLE. (Sundays included.)

L've Cleve., 7:15 p.m. | L've Buff., 7:45 p.m.  
Ar. Buffalo, 7:30 a.m. | Ar. Cleve., 8:00 a.m.

(Central Standard Time.)

Special Saturday Night Excursions to  
Niagara Falls.

Write for our tourist pamphlet.

H. R. ROGERS, W. F. HERMAN,  
Gen'l Pass. Agt. Gen'l Agt.

T. F. NEWMAN, Gen'l Mgr., Cleveland.

CHICAGO DAY AT THE FAIR—October 9th. Take Nickel Plate road's one  
fare excursion Oct. 2nd and be there.FOR NEW YORK AND BOSTON—Take the Nickel Plate road. Through  
sleeping cars to New York via either the West Shore road or the Lehigh Val-  
ley route from Buffalo. Through sleeping cars to Boston via the West Shore-  
Fitchburg route. Superb new dining cars. Low rates.H. A. BARR, PRESIDENT, F. H. VAN CLEVE, SEC. CAPT. GEO. BARTLEY, SUPT.  
Escanaba. Escanaba. Escanaba.**ESCANABA TOWING & WRECKING CO., Escanaba, Mich.**

Tugs, Lighters, Steam Pumps, Hawsers, Hydraulic Jacks and Diving Appliances always ready.

TUG MONARCH, Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch  
Stroke, Steam Pressure Allowed, 125 pounds.

TUG DELTA, Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.

TUG OWEN, Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.

**CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction****MECHANICAL****DRAWING Taught by Mail,**Also, MECHANICS, Mining, Prospecting, Arithmetic, etc.  
To begin, students only need know how to read and write.  
DIPLOMAS Awarded. Low Prices. Send for FREE Cir-  
cular to The Correspondence School of Mechanics, Scranton, Pa.



# S. F. HODGE & CO.

MARINE ENGINES,  
PROPELLER WHEELS,  
DECK HOISTERS,  
MARINE REPAIRS.  
320 ATWATER STREET,  
DETROIT, MICH.

## — THE — Bethlehem Iron Company

PRINCIPAL OFFICE and WORKS:  
SOUTH BETHLEHEM, PENNA.

Steel Rails, Open Hearth, Bessemer and Nickel Steel  
Billets and Forgings.

Hydraulic Forged Shafting, Hollow or Solid.  
Cranks, Rolls, Etc.

Rough Machined or Finished. Fluid Compressed Steel.

**GUNS and ARMOR.**

New York Office,  
80 Broadway.

Philadelphia Office,  
421 Chestnut St.

### LIFE-SAVING MATTRESSES.



will not absorb moisture and cannot become infected with the germs of any contagious disease. Furthermore, they make the most comfortable bed in existence. Be sure you have your new vessels fitted entire with our goods. Write for catalogue and testimonial letters.

**IMPORTANT.**—We have just received official notice from the U.S. Government, that ships having our AIR MATTRESSES can carry so many less Life Preservers. Manufactured and sold only by

METROPOLITAN AIR GOODS CO., 7 Temple Place, Boston, Mass.

THE ONLY MATTRESS made that is essential for steamship use; fitted with life-cords, each mattress becomes a LIFE PRESERVER and will hold up twenty persons in the water. They are also especially adapted for Steamships, Yachts, etc., as they are always pure and clean, never need renovating,

--- HORACE SEE, ---  
CONSULTING ENGINEER AND NAVAL ARCHITECT,  
--- ONE BROADWAY, NEW YORK.

## THE CONDIT FULLER CO.

CLEVELAND, OHIO.

BAR IRON, SHEET IRON, PLATE IRON, PIC IRON,  
BOILER TUBES, BOILER RIVETS, PLATE STEEL,  
CLINCH RINGS, GAS PIPE, BOAT SPIKES, STEEL NAILS.

Sales Agents of  
**THE CARBON STEEL CO.**

Manufacturers of  
OPEN HEARTH STEEL,  
SHIP PLATES, BOILER PLATES,  
ARCHES and STRAPS FOR VESSELS A SPECIALTY.

Write for Prices and List of Sizes.



**THE "WELLS LIGHT"**  
WALLWORK & WELLS' PATENTS.

**2000 CANDLE POWER!**

ESPECIALLY ADAPTED FOR  
**Dry Docks and Night Loading.**

PORTABLE,  
ENTIRELY SELF-CONTAINED,  
REQUIRES NO OUTSIDE MOTIVE POWER,  
UNAFFECTED BY WEATHER,  
NO SPRAY, NO SMOKE, SAFE AND ECONOMICAL.  
IN USE ON 15 DRY DOCKS ON THE LAKES.

ALSO ADAPTED FOR  
Iron and Steel Heating.

For Hull and Boiler Plates,  
Tubes, Bending, Straighten-  
ing and Laying Up Work.

For further particulars, address  
**WILLIAM HALPIN,**

Successor to KEEGAN & HALPIN,  
45 and 46 Washington St., NEW YORK.

**McMYLER MANUFACTURING CO.,** 180 COLUMBUS STREET, CLEVELAND, O.

— SOLE MAKERS OF THE —

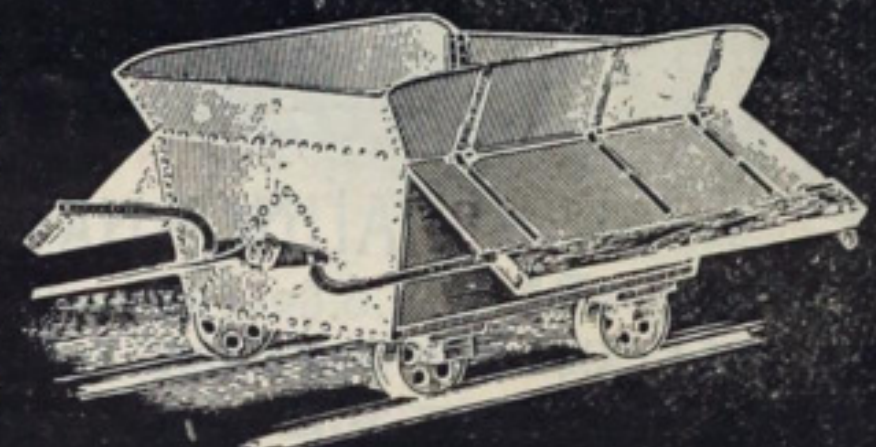
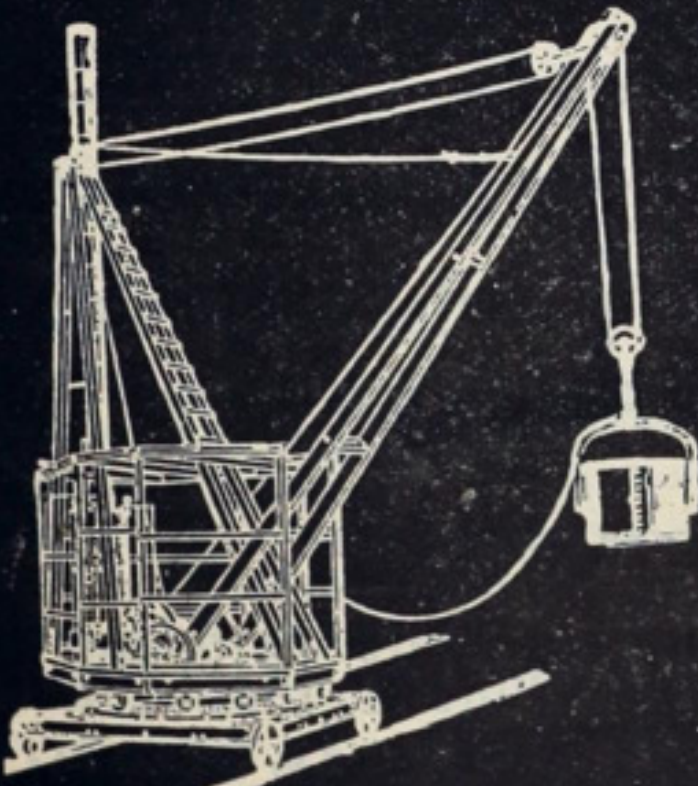
## McMYLER PATENT REVOLVING STEAM DERRICK

FOR HANDLING COAL, ORE AND COARSE FREIGHT  
OF ANY DESCRIPTION.

This Derrick can Lift Load, Alter the  
Radius of Boom, Swing in Either  
Direction at Will of Operator, and  
can Propel Itself on Track any De-  
sired Distance.

**BUILT FOR ANY CAPACITY WANTED**

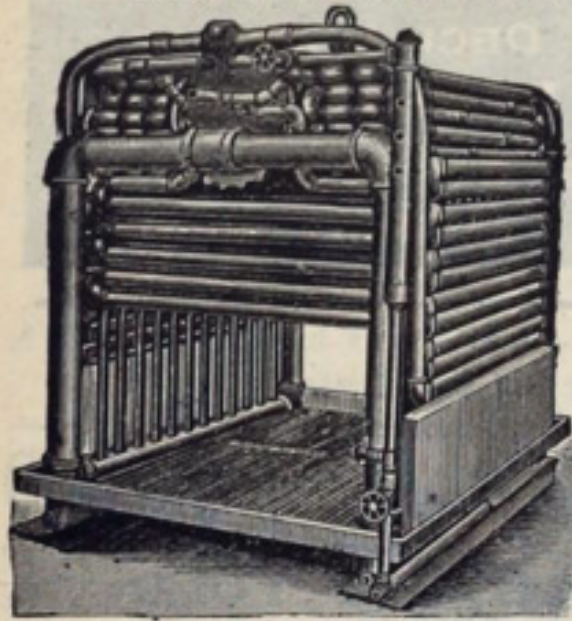
BUILDERS OF  
CONVEYORS, COAL BUCKETS, ORE  
BUCKETS AND DUMP CARS.





## THE ROBERTS

### SAFETY WATER TUBE MARINE BOILER,



For Yachts, Launches and other Steamers.  
THE ORIGINAL FIXED WATER LINE  
PIPE BOILER.

"Imitation the Sincerest Flattery." We are collecting royalties from the customers of many infringers.

OVER 500 IN USE.

SAFE, RELIABLE, SIMPLE, LIGHT WEIGHT, ECONOMICAL, NO SHOP REPAIRS, SMALL SPACE. Send for Illustrated Pamphlet and other reading matter, with hundreds of enthusiastic letters from purchasers and engineers.

The Roberts Safety Water Tube Boiler Co.

Works covering 12,000 sq. ft. of ground at  
RED BANK, N. J.

18 Cortlandt Street, NEW YORK CITY.

DAVID WHITNEY, JR., President.

THE

F. H. WHITNEY, Secretary

## MICHIGAN

Fire and Marine Insurance Company,  
DETROIT, MICH.

CASH CAPITAL, - - - - \$ 400,000.00

CASH ASSETS, - - - - 840,000.00

LOSSES PAID, - - - - 1,800,000.00

THIS COMPANY DOES A GENERAL MARINE BUSINESS on the GREAT LAKES.

AGENTS AT ALL PRINCIPAL LAKE PORTS.

*The Martin-Barriss Co.*

IMPORTERS AND MANUFACTURERS OF

*Mahogany, White Mahogany,*

AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR  
CABIN WORK AND INSIDE TRIM.

*White Oak Timbers and Plank*

CONSTANTLY ON HAND AND SAWED TO ORDER  
ON SHORT NOTICE.

654 Seneca Street,

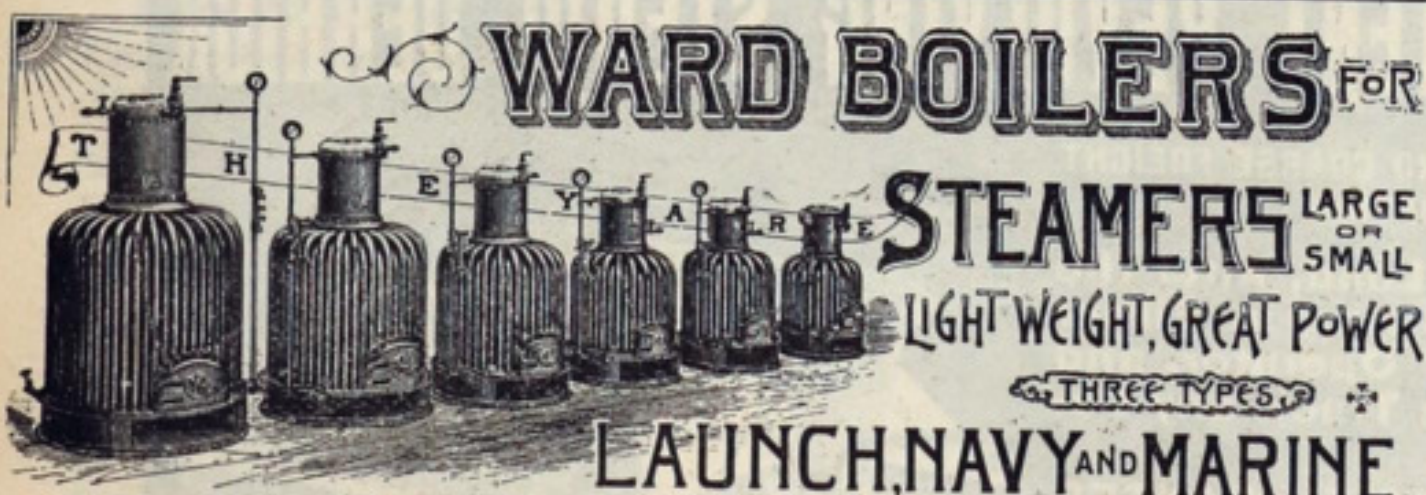
Cleveland, Ohio.



**ERIE RUBBER CO.**  
ERIE, PA.

Manufacturers of the  
**KEYSTONE MARINE VALVE**

THESE  
**RED RUBBER VALVES**  
ARE THE  
**BEST AIR & FOOT VALVES MADE.**  
IF YOUR DEALER DOES NOT KEEP THEM,  
WRITE DIRECT TO THE FACTORY.



**WARD BOILERS** FOR

**STEAMERS** LARGE OR SMALL

LIGHT WEIGHT, GREAT POWER

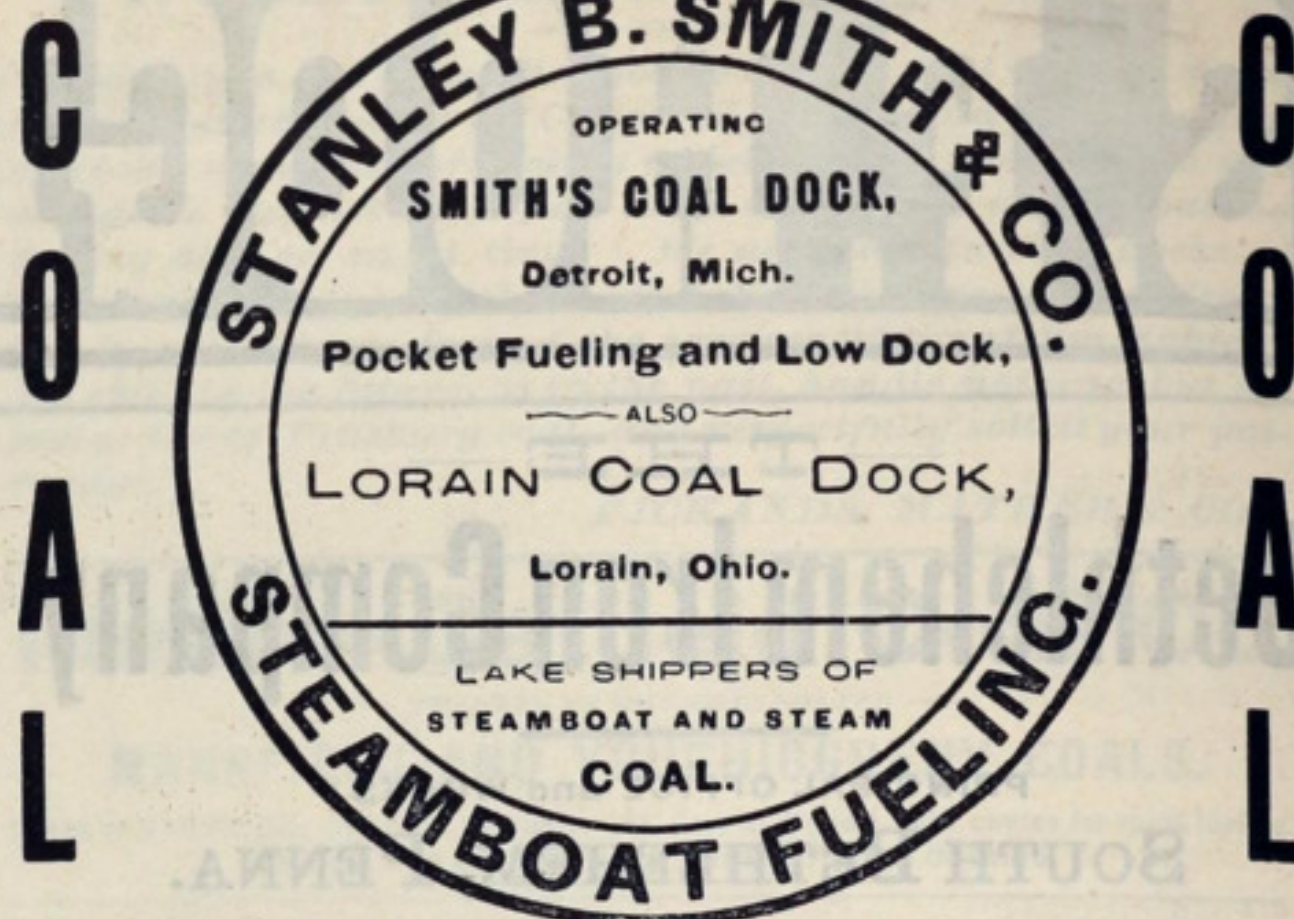
THREE TYPES

LAUNCH, NAVY AND MARINE.

ADOPTED BY U.S. GOVERNMENT. WAR VESSELS, LAUNCHES, REVENUE CUTTERS, TUGS.

**CHARLES WARD,**

CHARLESTON, KANAWHA CO., W. VA.



INCORPORATED 1794.

Insurance Company of North America.

CAPITAL, Paid up in Cash, - - - \$3,000,000.00

ASSETS, - - - - - 9,744,513.70

CHARLES PLATT, President.

EUGENE L. ELLISON, 2nd Vice-President.

JOHN H. ATWOOD, Assistant Secretary.

WILLIAM A. PLATT, Vice-President.

GREVILLE E. FRYER, Sec'y. & Treas.

GEORGE L. McCURDY, Manager.

CHICAGO, ILLS.

Lake Marine Department.

**ALMY'S PATENT**

**SECTIONAL WATER**

**TUBE BOILER.**

The Most Efficient and Reliable Water  
Tube Boiler on the Market.

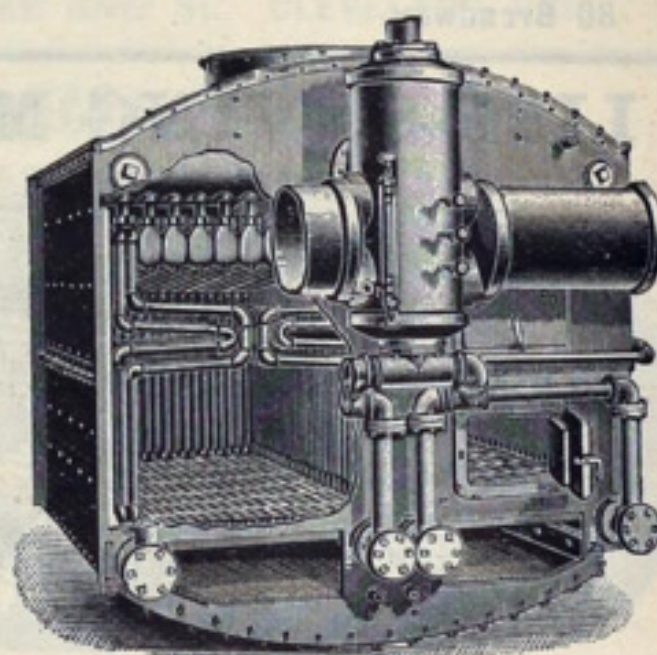
is neither a copy nor an infringement  
of any other Boiler.

MANUFACTURED BY

The Almy Water Tube Boiler Co.

No. 47 CLIFFORD STREET,

PROVIDENCE, R. I.



**THE BEST PAINTS FOR IRON**

ARE MADE BY

**W. W. LAWRENCE & CO.**

PITTSBURGH, Pa.

RED LEAD,

Red Lead & Lamp Black,

P. R. R. Red (iron oxide),

METALLIC REDS,

METALLIC BROWNS,

GRAPHITE PAINT,

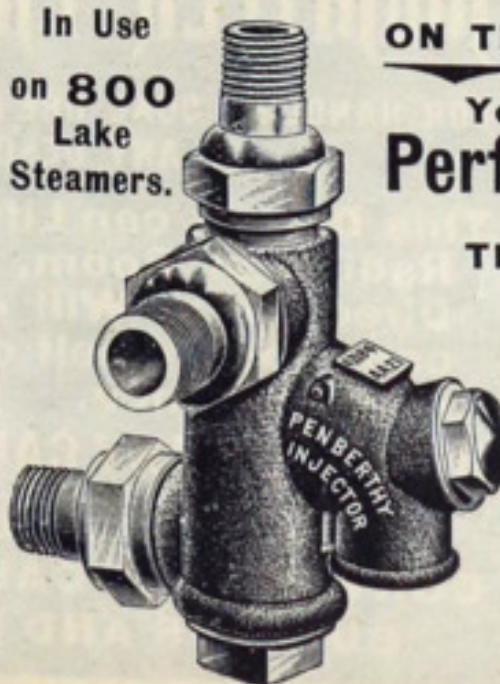
IRON FILLER,

STEEL COLOR PAINT,

CARBON BLACK.

CORRESPONDENCE SOLICITED.

In Use  
on 800  
Lake  
Steamers.



ON THE LAKES In Rough Weather  
You Want a  
Perfectly Automatic Injector.

THE **PENBERTHY**

Is the only one which will give you satisfaction.

SEND FOR CATALOGUE.

**PENBERTHY INJECTOR CO.**

Detroit, Mich.

See our exhibit, Section 25, Mch. Hall, Worlds Fair.